ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by PETER ZODAC

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CHIPS FROM THE QUARRY

1st National Convention
American Federation of Mineralogical Societies
June 13-16, 1948
Denver, Colo.
(Richard M. Pearl, Convention Chairman, Colorado College, Colorado Springs, Colo.)

9th Annual Convention
California Federation of Mineralogical Societies
July 16-18, 1948
Municipal Auditorium
Long Beach, Calif.
(Convention Chairman, 1850 E. Pacific Coast Highway, Long Beach 6, Calif.)

Convention Progress

All "ROCK HOUNDS" take heed! This is going to be a big show so plan to be there not only in person but with a display of your best acquisitions. You can display crystals, rare minerals, or any or all types of lapidary work, but you will have to bring your own case. We are pleased to announce that the Los Angeles Lapidary Society is going to exhibit en masse. Any other clubs that would like to follow suit just let us know.

Several clubs have written in about club exhibits. Letters are now being prepared that will give full particulars about size of cases, time to place exhibit, and also information on housing and banquets. These will be ready in the near future.

In case anyone interested in Commercial Space failed to receive an invitation you can get all the information by writing to Convention Hdqtrs. 1850 E. Pacific Coast Hywy., Long Beach 6, Calif. This applies also to dealers not located in California.

NOTICE

The June issue of *Rocks and Minerals* may come out very late, as the Editor plans to attend the big Convention at Denver, June 13th-16th.

International Geological Congress
18th Session—Great Britain, 1948
Aug. 25-Sept. 1, 1948
(A. J. Butler, Gen. Sec. Geological Survey and Museum, Exhibition Road, London, S. W. 7, England)

Some 1,100 geologists from countries overseas plus British geologists will swell the attendance to over 2,000. Twenty-eight Governments and about 160 universities and scientific institutions will be represented at this, the world's greatest geological congress which meets every two years and each time in a different country. Field trips to many geological and mineralogical localities are on the program.

Northwest Federation Convention
Sept. 4-5, 1948
Bozeman, Mont.
(H. E. Murdock, Vice-President, Bozeman, Mont.)

MEXICO VISITED

Last month we closed up shop and took three weeks off, supposedly to attend the big mineral show at Austin, Texas, April 17th-18th.

We flew to Detroit, Mich., on the 11th, and next day, in the good company of Don Gabriel, of that city, we headed south by car. We drove thru Indiana, Illinois (visited the fluorite district of Cave-In-Rock and Rosiclare), Kentucky, Missouri, Arkansas (visited the mercury and diamond mines at Kirkby and Murfeesboro), and down into Texas. The mineral show was a big success and a report on it should appear in the next issue of *Rocks and Minerals*.

After the show, instead of returning home immediately, we were "forced" (suggestion only) to accompany Mr. Gabriel into Mexico where some of the spots visited were the famous opal mines near Queretaro and an onyx quarry near Puebla. The trip was a most interesting one and someday we may write it up.

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THE GEODES OF OPUTO

By RONALD L. IVES
Vice-President, Rocks and Minerals Association

INTRODUCTION

Some mineral localities are discovered, worked for a few years, and then forgotten; even though their productivity has not declined. Such, indeed, has been the fate of the geode locality of Oputo, in the mountains of central Sonora, Mexico.

Apparently, the only clear description of this locality is the work of an anonymous Jesuit Father, who, although untrained in mineralogy, described clearly what he saw[1].

SITE DESCRIPTION

"Five leagues north of Guasabas, at about a stone's throw eastward from the road leading to Opotu, there is a vein more than six yards wide and very long, which encircles a small hill, at the foot of which it lies, from the north side around by the south to the east. This vein produces a kind of round pieces of stone, some as large as a hen's egg, others the size of a cocoanut, which on the outside look something like jasper in the rough, red in color, with white stripes. Many of them are loose on the ground, others are half embedded in it, while others are entirely under ground. Sometimes the small ones stick together in groups of three, four, six and even more. Some of them sound when they are shaken, because of the looseness of the core, which is a white substance, somewhat yellowish, almost transparent, were it not for a film that covers it like a coat of turpentine. All of them are somewhat hollow, and some, when opened, are found to be covered on the inside with points of very fine crystal, some quite large, but most of them very small; all, however, with five, six or more angles, so perfectly finished and so well united, so beautiful and so brilliant that they look like the work of a lapidary.

These crystals are set in very fine, hard flint, pearl colored or bluish, and some purple; for which reason it is difficult and almost impossible to detach them for experimentation without injuring them. Perfect as is their brilliancy, etc., the natives say that in former times the cavity of these stones or balls was filled up with a thick substance similar to the white of an egg, instead of the points of crystal, and I had in my hands, in the year 1752, one which the substance was not entirely hardened, and although it was not quite soft, yet it was somewhat ductile until it became petrified by being exposed to the air.

It is evident that this is a rare and new production of nature, which although of no value to the Royal Treasury as measured by the carat, is, however, of great interest to the learned investigators of the precious novelties of nature, as well as for those who, rising above earthly things through meditation, *ascensiones in corde suo*, admire and praise the power, the wisdom, the goodness and beauty of Him who reaches from one extreme of the world to the other, and orders all things with admirable might and sweetness."

The foregoing account, although almost two centuries old, can hardly be improved upon. There can be no doubt that the missionary priest saw—and appreciated—a geode.

Geodes from "Opotu" are not well known—in fact, the town is not mentioned in available geological bibliographies, or in standard works on mineral locations. Is this site recoverable?

(1) Guitéras, Eusebio (Translator), *Rudo Ensayo*, Records Amer. Catholic Hist. Soc. Vol. 5, 1894, pp. 214-215.

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TENTATIVE SITE IDENTIFICATION

From the context of the *Rudo Ensayo* we learn that "Opotu" is in the province of Sonora, and in the Rectorship of the Three Holy Martyrs of Japan, an extinct political unit. It also appears that "Opotu" is ten leagues north of Guasabas, on the banks of a river locally called "El Grande" (This is not the Rio Grande). In addition, "Opotu" is described as being fourteen leagues slightly south of west of Guatzinera, and about an equal distance southeast of Nacozari. Some latitudes and longitudes (east of Madrid) are given, as well as a number of additional place names and descriptions.

These data place the site of "Opotu" in the present district of Moctezuma, in the Mexican State of Sonora, on the Rio de Bavispe, an important tributary to the Rio Yaqui. The only adjacent town still existing with name unchanged is Nacozari then, as now, a prosperious mining community. A few of the better modern maps show the Sierra de Madera de Oputo southeast of Nacozari, and two of them[2] show the town of Oputo at the southeast end of this range, in the valley of the Rio de Bavispe. If the present town of Oputo is the same as the "Opotu" in the narrative, a town having a name resembling Guatzinera should be present about 38 trail miles[3] to the east; and another called something like Guasabas should be about 27 trail miles downstream.

Checking of the narrative against modern maps discloses that the modern town of Huasabas ("Guasabas") is 18 miles down stream from Oputo. As the map distance is air line, in a region where the river, and hence probably the old trail, meanders considerably, a discrepancy of nine miles is without significance. The modern town of Huachinera ("Guatzinera") is about 26 miles almost due east of Oputo. Again, the trail distance, as reported, is about 1.5 times the air line distance, which is not unreasonable for a trail which goes up a stream valley, over a mountain pass, and down another stream valley.

From the cartographic data, it seems probable that the site of Opotu, as described in the old narrative, is real, recoverable, and substantially identical with the location of the present town of Oputo. A further check is furnished by the mineralized nature of the area, and by the finding of several beautiful vug-linings in the vicinity of Nacozari, a large modern mining community. A few of these have found their way into museums; others were used, in years past, as altar decorations.

The above data and the conclusions therefrom, suggested that geodes should be present in the valley of the Rio de Bavispe, at the base of a small hill, about nine miles below the present town of Oputo. Location of Oputo is shown in Fig. 1 [4].

SITE VERIFICATION

Although neither field notes nor available geologic reports mentioned the Oputo geode site, the descriptions seemed clear enough to warrant further investigation. In consequence, a note was written to the *Comisario*[5] of Oputo, describing the geodes and the location of the site, and requesting further information.

Three weeks later, a generous collec-

(2) *Sonora,* 1/1,000,000, Amer. Geog. Soc. of N. Y., prov. ed. sheet NH 12, 1937: *Sonora River,* 1/1,000,000, U. S. Coast and Geodetic Survey, World Aeron. Chart, Sheet 471, 1946.

(3) Distance conversions are based on the relation: 1 league = 2.7 statute miles. This value is substantially correct for most distances in northern Mexico and the southwestern United States from 1500 until about 1800. Since that time, the length of the league has been changed by law in most places, so that this relation is not necessarily applicable to modern accounts. With few exceptions, modern maps from Spanish America carry a metric scale (distances in Kilometers).

(4) Details of terrain and other settlements are shown in the maps of reference 2. Road information is as of 1946. Because of an extensive program of road improvement and construction in Mexico, road conditions may be better than is indicated by present maps, and local inquiry is advisable.

(5) The *Comisario* is an elective municipal official, whose duties and responsibilities include most of those of both mayor and sheriff in a community in the western United States. In most instances, the *Comisario* is a man of considerable ability and education.

tion of mineral samples, followed by an informative letter, was received from Sr. Rubén S. Moreno, of Oputo, who, in response to the request, had gone to the described location, and had collected not only the requested material, but several other specimens of interest!

MINERAL SAMPLES FROM OPUTO, SONORA

Study of the samples disclosed that Oputo was not just a geode locality, but was a highly-mineralized area, containing a great variety of material. The more important specimens include:—

Geode: Small, beautifully-formed geode fragment, with red jasper outer shell, laminated silica inner shell, complete interior lining of small transparent quartz crystals, and partial lining of larger brown calcite crystals, growing over the quartz crystals. A section of this specimen is sketched in Fig. 2.

Agate: Several agate stream pebbles, containing dark discolorations. This material takes a high polish, a section showing patterns in black on a light cream ground.

Barite: Several rounded stream pebbles composed of cream to white barite.

Calc Spar: The samples included a number of cleavages of clear, transparent calcite, exhibiting typical double refraction. This material is of superior grade, suggesting that some Iceland Spar, of optical grade, may be present in the locality. Two of these specimens showed well-developed "fishtail" twinning, which is common in both calcite and Iceland Spar.

Concretions: Several of the stream pebbles resembled cave pearls quite closely,

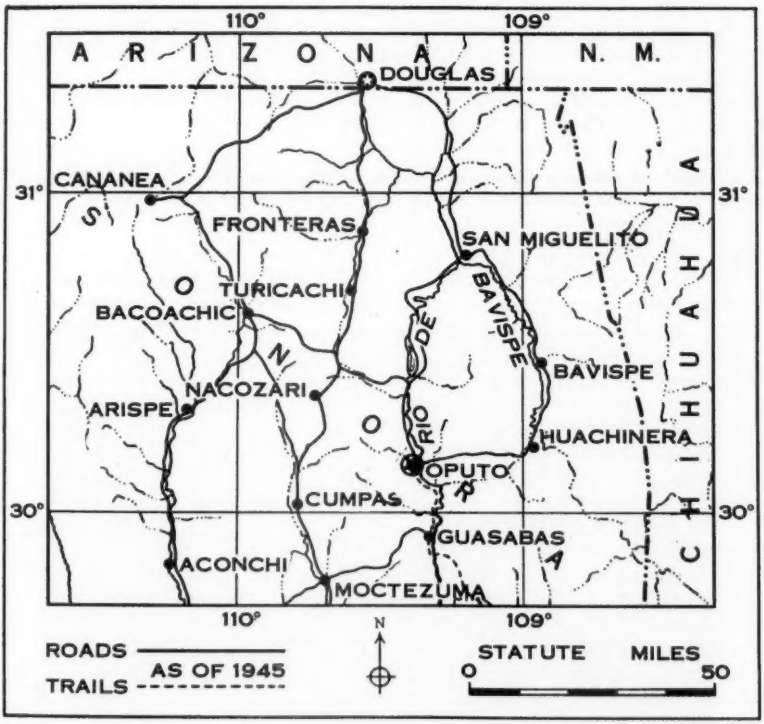

Fig. 1 Summary map of a part of northeastern Sonora, Mexico, showing location of Oputo, principal settlements, and major roads.

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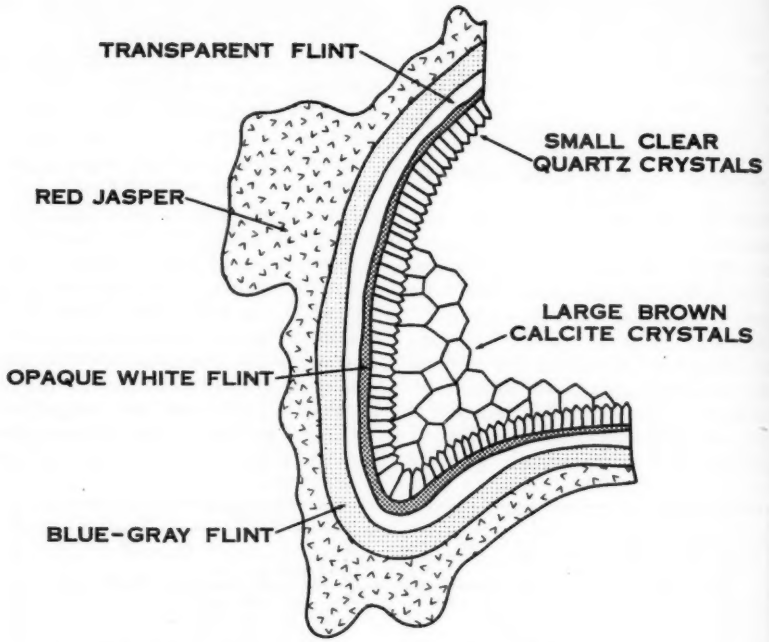

Fig. 2 Rough sketch of a section of a geode sample from Oputo, Sonora, Mexico. Note the close resemblance of this sketch to the narrative description.

being formed of concentric layers of calcite. Analysis showed that a small amount of lead carbonate was also present in one of them. Exact origin of this material was not indicated by tests.

In the accompanying letter, Sr. Moreno stated that mining activity had brought new life to Oputo, with a local lead mine having considerable importance. A vein of emery not far from the town was also described.

CONCLUSION

Accuracy and dependability of the description of the Oputo geode site, written almost two centuries ago, is clearly demonstrated by the recovery of the site and by the similarity of the sample, collected by Sr. Moreno, to the description of a geode observed by the anonymous Jesuit priest.

It appears that the Oputo area is a commercial producer of lead; a possible producer of emery and optical spar; and a source of mineral specimens, particularly geodes and agates. Because of recent (and continuing) road improvements, the region is not too difficult of access. A further investigation of this region might be very productive.

NOTICE

The offices of *Rocks and Minerals* may be closed during the period of June 10th-23rd as the Editor plans to attend the 1st National Convention of Mineralogical Societies at Denver, Colo., June 13th-16th.

The June issue of *Rocks and Minerals* may be late—out around June 30th.

A FAMOUS QUICKSILVER DEPOSIT IN CALIFORNIA

By R. F. HENLEY

4075—19th Street, San Francisco 14, California

About 140 miles southeast of San Francisco is located one of the largest and most productive quicksilver mines in the world, the New Idria mine in San Benito County. There are about twenty mines altogether in the New Idria District but this and the San Carlos are the only ones that have proved to be steady producers. The New Idria, since its discovery in 1853 to the close of 1944, had produced more than 433,000 flasks and is still producing.

This area is also the source of benitoite, a gem stone which has so far been discovered nowhere else in the world. It has been so thoroughly explored that it is a forlorn hope to search for it.

The writer, with Mr. Clarence B. Crane of Berkeley, recently went to this District to visit the Aurora Mine which is about three miles from the New Idria and at present, like most of the others, is not being operated. We were interested in securing some silicified serpentine for gem material that has been found there as well as some fine fluorescent calcite on cinnabar.

At the New Idria the waste material is all stored under ground to fill the voids created in mining operations so we spent no time there but at the Aurora we were fortunate in securing a small quantity of what we were in search.

This area runs from 2300 to over 4800 feet in elevation and we were fortunate in having good weather late in November. On account of its out-of-the-way location, it is seldom visited by transients and we were well received by the local people.

Going from this place we went to the new Guadalupe mine in Santa Clara County which is also a quicksilver mine and at present not operated. Here we went out at night with a Mineralite and found the dumps fairly glowing with bright color. There is some massive material which makes good book ends and similar novelties. Whether this mine ever re-opens is doubtful and will no doubt depend on the price of quicksilver as with many of the others that are now closed. Perhaps this is a good thing as it means a reserve that can be used in event of war and a heavy demand with good prices which will warrant operations.

Clarence Crane and the jeep at New Guadalupe Quicksilver Mine in Santa Clara County, Calif. Retort at left. The massive rocks at right contain wide veins of fluorescent calcite.

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GEM STONE BUTTONS

By L. M. SHIPLEY, Gem Village
P.O. Box 232, Bayfield, Colorado

In the epochal time of the past, the cave man huddled in the protected corners of dim caves and drew the animal hides around his body. There were only two things of uttermost importance, self-protection and food.

From the very begining, necessity has been the mother of invention. The cave man wore the hides to protect his body from the elements of nature, because of his dire necessity he learned to weave a feather cloth, then came a cloth he wove from the fibers that grew from the earth. From the time that the first bone-all pierced the animal hides to be worn for clothing, man has been on the up-ward trend.

Somewhere among those very early necessities,appeared the button, not for beauty,—but for use, to hold the cloths upon the human body. In the Museum at the Mesa Verde National Park, in Southwest Colorado, is a display of various types of buttons that were made and used by the prehistoric man of that era.

Later, as man learned to make buttons of metal and shell, they were worn as ornaments of beauty, as well as for use.

Out of the inventive brain of man, today we have a substance called plastic. Therefore we have plastic buttons, of all hues and colors never before obtainable.

Now, we have another button; the aristocrat of all buttons because it is made of Gem Stone. A Gem Stone that is found in only one place on our universe. America has the only known deposit of Ricolite in the world. Found in Ash canyon, near Red Rock, New Mexico. In the pre- Cambrian mass on the west edge of the Burro Mountains.

Ricolite,—the Gem Stone of the Serpentines came to light in about 1888 when a shipment was sent to Chicago to be used for ornamental purposes. Because of its weakness along certain contact portions, it was impossible to use large thin slabs of this material, therefore the project was abandoned.

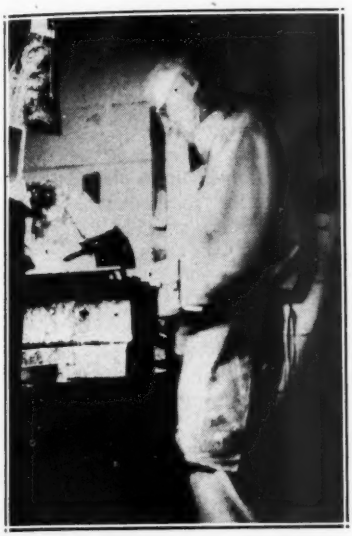
For the lapidary, Ricolite is ideal, to make into cabochons and other jewelry accessories, such as—ring and bracelet sets, belt buckles, hair ornaments, and etc. For fine art objects, book-ends, ash trays, paper weights, lamp basses and other decorations for the home. The use of Ricolite extends just as far as the imaginative brain can reach, because of its toughness of material and the color combinations its variations of uses are unlimited.

Down there, in "The Land of Enchantment", that famous state of New Mexico, is a small mining town called Pinos Altos; Spanish for tall pines and indeed the pines are tall and beautiful. Pinos Altos is the gateway to the great unexplored wilderness of the Gila National Forest. There at the foot-end of the Rockies, a man from Connecticut working in his lapidary shop developed the idea of carved gem stone buttons. Mr. Cunningham tried various materials finding Ricolite to be the best suited material for the purpose.

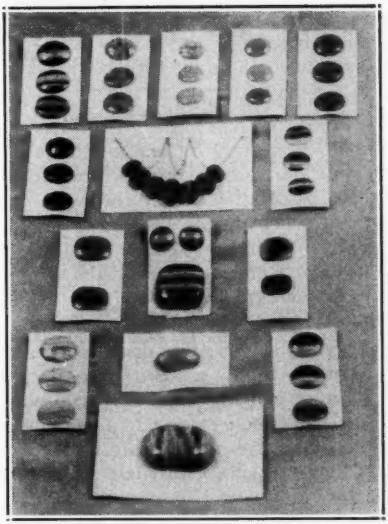
Today, Mr. Noel Cunningham and his son, Nephin, own and operate The Pinos Altos Craft Shop, specializing in Ricolite Buttons and all Accessories there-with.

These buttons are made square, oval or round with the sewing lug cut integral on the underside of the button that provides strength and lightness and may be sewed close to the cloth, thereby preventing that 'sagging, hang-down' of the various commercial buttons. Comes in sizes from the small blouse button to large sized coat buttons and can be made to individual specifications.

Colors,—yes, there is quite a variety; from the canary yellow, with or without inclusions; grey with fine black lines, the browns and tans also mottled. When old



Mr. Noel Cunningham at work on his Ricolite buttons.



Various buttons and accessories made of Ricolite.

First row (outside)—buttons.

Top (center)—brooch.

Bottom (center)—belt buckle.

Second row (outside)—buttons.

Center—earring and belt buckle.

Third row—buttons and necklace.

Fourth row (top row)—various buttons.

Mother Nature gave us the ideal button material she also gave us the one color that is nature's own, that rich apple green, the background for every flower that grows. Those beautiful green Ricolite buttons with the white or black bands may be worn on any color dress or suit with just as much pride, as you'd wear your finest diamond. There is nothing synthetic or imitation about diamonds or Ricolite; they are both nature's own, a long way apart on the scale of hardness and value, but Ricolite is the rarer of the two. There are lots of particular people and gem stone buttons and accessories made of Ricolite have an appeal to the discriminating people of the world.

To the collector and lapidary—who like to make things in their own shop—Ricolite is the material you have been looking for, it saws smoothly and will work out nicely even in small thin sections. Can be drilled and routed, carved or shaped, and takes a nice polish. The greens with the bands of white or black is the true Ricolite and the best for use and beauty. The green Ricolites are semi-translucent and when well polished resist scratching. The yellows and lighter varieties are softer material more susceptible to flaws and may be used where softer materials are desired.

There isn't space to give you here the detailed instructions on polishing, drilling and routeing of Ricolite, but I will be glad to send you any further information concerning this material, that you too may have the pleasure of making things from Ricolite.

Fiedler's Catalog of Books on Geology

Henry George Fiedler, 31-33 E. 10th St., New York 3, N. Y., has released Catalog No. 104 which consists of 60 pages. The catalog lists 2nd hand books and periodicals on geology, mineralogy, mining, etc.

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ROCKHOUND'S "ESCAPE".

By KARL HUDSON
Durango, Colorado

"Is everybody happy?" We are sorry Mr. Lewis, but that's one - - - - of a question now-a-days. With one dictator waving a sickle, your favorite grocer taking the last nickel of your pay check, the income tax department blatting over the radio that it's time for another installment, and your congressman voting the wrong way on your pet peeve, the question is definitely out of date.

Apparently an evening down at "Joe's" now and then only makes matters worse.

With a national case of "screaming jitters" we'd better look to bigger and better hobbies or start voting bonds for more "psychopathic hospitals". In the end the "hospitals" could only result in one group of "cases" taking care of another group of "cases" which would be the height of something or other.

That peculiar group known as "rockhounds" have the edge of an advantage over the others. (Not the arm-chair variety but the real "dyed in the wool" rockhounds.) For one thing they'll be harder to catch when we are all ready for the "booby hatch".

We had better forget our "peeves" and start thinking over that trip. Get a bunch of maps from your local service station, all the back issues of *Rocks and Minerals* you can find and start planning. Then one of these days when the boss says "your number is up" (for a vacation that is) draw your salary in advance—we'll have to leave it up to you as to just how to go about doing that—and start out. Of course we don't recommend it, but if you are in too big a hurry to go by and pay the grocery bill, power bill, rent etc., you can finance a longer trip. This may lead to complications upon your return but why worry about that now.

With your salary in advance and the grocery, power and rent money in your pocket, you may think that with the present prices of hotel or "motel" rooms, meals at restaurants, etc., it won't last long any way. Now, we have nothing against the proprietors of these establishments, they have to live too, but you are going to miss a lot of good localities if you have to make it to the next town every night for accommodations. Any way the best rocks are always found just at dusk and if you can camp right there and follow up your "leads" the next morning, you won't have to dream for the next fifteen years or more about what you might have found.

Half the fun and ninety percent of the benefits of a rock hunting trip are derived from camping out any way. With the exception of car expense, your expenses are cut to about what it would cost you to live at home. The cost of equipment is usually less than a few nights lodging.

As to equipment for a summer trip, the simpler the better, (remember there'll be rocks to haul). For sleeping, an inexpensive sleeping bag and a good army blanket or two is best. An air mattress is a wonderful thing but if you are like the writer and can't afford it, a folding canvas army cot will do. Very probably you won't sleep much the first night off of inner spring mattresses, but loss of a little sleep didn't kill you when you stayed at that party last week until the wee small hours. Neither will this. By the third night you will be so tired that you could sleep on a rock, any way.

One thing to remember is that it is goin to rain at least once on the trip. It rains on rock trips even in localities where rain has never been known before, but Boy!, do the rocks show up after a nice shower the night before. I have camped for weeks under a waterproof tarp stretched over the car and staked out to one side, but perhaps an umbrella type, waterproofed, "automobile tent" would appeal to many. They give more privacy, are practical and satisfactory and only take a few minutes to set up.

For camp light I have a good gasoline lantern but usually take along an old kerosene lantern instead as being more

convenient, however it has to be packed in a box by itself and right side up as kerosene on the grub don't improve its taste.

Yes, it's "GRUB" on a camping trip. If you have an outdoor fireplace or have camped before you are already a camp cook but if not you'd better do a little experimenting out in the back yard before you start. You may want to use a gasoline stove as it is quicker than an open fire and may be used in some places where an open fire is impracticable or impossible. In any event where possible and safe, build a fire near your camp, if for no other reason than just to get a little smoke in your eyes and acquire the usual "smell" of a camper (or sheepherder). The writer always takes the gasoline stove along—and then does all his cooking in a "dutch oven" over an open fire. The stove adds ballast and a few more rattles to the outfit but makes camping possible in some places where a fire is impossible.

Carry enough water for one night's camping at least. If for nothing else you will need it to wash dishes, and you may need it for the radiator.

As you may well know, the "little woman" won't do all the cooking on the trip. She'll probably stall around hunting rocks until you can't take it any longer and will be forced to fix up something to eat or starve. Another thing, DON'T take along any of her best cooking utensils or dishes. You are going to have enough troubles when you return home as it is and there is nothing so disconcerting when gloating over a particularly fine specimen or gem stone as to be reminded that is was collected the day you broke that cup from the only matching set of dinner ware that she had, or that smoke from your camp fire ruined her best stew pan. A "dutch oven", tin plates and cups are best any way. Place your grub in different corners of the dutch oven for heating. Only a rockhound, cowpuncher or sheepherder knows where the corners are in a round dutch oven.

Upon returning home you will spend many evenings sorting, studying and classifying the fine specimens and memories which you acquired and in planning a "bigger and better trip" for next year.

Then when some one brings up the problems and irritations of "civilization" you can begin a long story by saying "Well, now, I know of a place where there are 'purty' rocks everywhere"—"fish and game to eat"—most beautiful scenery in the country"—etc., etc.", "and I'd just as soon pack up my things and go there if life gets too darned complicated here".

Perhaps you'll do just that—we did!

NEEBISH ISLAND, MICHIGAN

By JOSEPH A. MANDARINO
1034 N. Keystone Avenue, Chicago 51, Illinois

On August 28, 1947, the writer set out with Mr. F. C. Archer to inspect the waste piles of the Neebish Island Cut. The cut is about 20 miles southeast of Sault Ste. Marie; between Neebish Island and the eastern part of Chippewa County in the Upper Peninsula of Michigan. It is used by downbound ore boats and freighters, and is cut through Trenton limestone.

The Neebish Island side of the cut was visited first. Here were found some very good calcite crystal groups, ranging in color from white to buff. The crystals, which are rhombohedrons and scalenohedrons, range in size from 1/16" to ¼". A few small crystals of marcasite were found associated with the calcite. Some good crinoid stems were also found at this spot.

The mainland side of the cut was visited next, and it was found that the dumps on this side were much more weathered than those on the other side. No crinoid stems or calcite crystals were found, but quite a few pelecypods were collected. One orthoceras was also found.

There are several dirt and gravel roads leading to the cut. The collector desiring to visit the island, may make use of the ferry which operates regularly. Thanks are due to Mr. Archer, in whose motor boat the trip was made.

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HEAVY GRAVITY MINERALS IN THE SANDS OF FLORIDA

By WILLIAM C. CASPERSON
Curator, Paterson Museum, Paterson, N. J.

In the spring of 1946 I was asked to make an investigation of the report that important minerals were being found in the sands of the beaches and shores of the Ocean and the Indian River in Florida. I found the report correct.

In many of the sand dunes throughout the State these minerals are to be found comprising from 1 to 8 per cent of the sand content of the soil. Where water from waves and tides wash the shore line these minerals which are much heavier than the silica sand are separated from the lighter sand and accumulate in rich deposits, sometimes as high as 90 per cent concentrates. The process which brings about these deposits is much like panning for gold. The incoming wave carries the minerals with the silica sand to its crest. At the crest of the wave the water momentarily stops, at which instant the heavy minerals fall while the lighter materials, the silica sands, are carried back with the receding wave. This goes on hour after hour and when the wind is in one direction for days quite a deposit is formed of heavy minerals, sometimes several inches thick. In this way, alternating layers of mineral and of silica sand comprise rich deposits on the shores of ocean, lakes, and rivers.

These minerals are not peculiar to Florida only. They are found in many countries. Some of the well known of these deposits are India, Australia, Norway Brazil, and in this country, Idaho, Florida, Georgia, the Carolinas, and Maryland. These minerals are also found in the clay beds of New Jersey. A study of these occurrences has been made by Dr. A. C. Hawkins, two articles on the subject appearing in the *American Mineralogist*—one in Vol. 18, No. 4, April, 1933, and the other, in Vol. 20, No. 5, May, 1935.

In every instance, the minerals in the deposits are those common to the region where the deposit is found. In Connecticut deposit, tourmaline, staurolite, garnet, and feldspar predominated. In Ohio deposit magnetite was the chief mineral.

A peculiarity of the Florida mineral deposits is the uniformity of the ratios of the minerals. The minerals in the Florida sands with ratios of occurrence is as follows:

Ilmenite, 50 to 55 per cent of concentrates; Rutile, 10 to 20 per cent of concentrates; Zircon, 10 to 20 per cent of concentrates; Monazite, 1 to 2 per cent of concentrates.

These are the four minerals which are in demand and which are profitably recovered. Other minerals in the concentrates in their order of occurrence are:

Garnet, (Rhodolite and Spessartite are the two varieties noted); Epidote; Staurolite; Feldspar; Tourmaline; Beryl; and a small amount of what I believe to be Pitchblende—Uraninite.

The presence of these minerals has been known for a number of years but until recently they were not in sufficient demand to warrant their recovery. It was during the period of the First World War that they began to attract attention. From then on until today the demand for the products of these minerals has increased very rapidly, until they are now considered strategic and their products indispensable.

The recovery of these minerals began in Florida in the year 1916 by the mining of ilmenite for making titanium tetrachloride for war purposes. Later the uses for zirconium and titanium encouraged the recovery of these heavy minerals. An operation south of Jacksonville thrived for several years. In 1941 the only recovery operation was conducted by the Riz Mineral Company, with a plant south of Melbourne. This is the oldest recovery plant in Florida now in operation. The Humphry Gold Corporation is operating a plant at Jacksonville where they are fractioning a 4 per cent ore from the in-

land sand dunes. The importance of these minerals has brought other operations to the State which are now making ready for their recovery.

The operation in the recovery of these heavy minerals consists of taking the rough ore sand and separating from it the minerals as concentrates. These minerals being so much higher specific gravity than the silica sand and shell, they can be separated by a tabelling process in which the tables with whiffle strips are made to vibrate as the water laden rough ore flows over them. The whiffle strips hold back the minerals allowing the silica sand to flow off as waste. The concentrates are then taken, dried and run through electrostatic and magnetic machines, where their susceptability to electronic force permits a separation. They are bagged and shipped or turned into products by manufacture.

ILMENITE is a Ferro-Titanium Composition. The ilmenite in Florida carries from 53 to 58 per cent of titanium—TiO_2. Titanium has many uses. Manufactured into TiO_2, or Titanium Dioxide, it is extensively used in the manufacture of paints and toilet powders. It is also used in the manufacture of rubber, soaps, linoleum, leather, plastics, ink, textile printing, paper, and ceramics. The metal titanium has great potential uses, especially in airplane manufacture. It has great promise also as a Ferro-Titanium Alloy with ratios of 25 per cent Titanium and 75 per cent Iron. Ilmenite runs about 55 per cent of the heavy gravity minerals.

RUTILE carries about 94 per cent Titanium and its uses are similar to those of ilmenite. Rutile comprises about 10 to 20 per cent of the concentrates.

ZIRCON is the ore of Zirconium metal. It is also the source of ZrO_2. These products are much in demand at present. The uses include opaque white enamels, abrasives, optical glass, pyrex, spark plugs cutting tools, and electrical resistance units. Zircon comprises from 10 to 20 per cent of the heavy minerals.

MONAZITE is composed of the radioactive element, Thorium, Cerium, and other rare and very valuable elements. Monazite is not plentiful, comprising only about 1 to 2 per cent of the concentrates. The other minerals have slight value, but their uses are limited and their recovery is not particulary profitable.

The origin of these heavy minerals is most interesting. As I have already said, the minerals found in a given locality have their counterpart in the area adjacent to the deposit. It may be many miles away, but as a rule, they can be traced to their original source. A very interesting phase of Geology is the marvelous way, through weathering, and the disintegration of the mountains, erosion and the action of wind and water, the finely pulverized rock and their constituents have become so widely dispersed.

These minerals in Florida undoubtedly came down from the mountain region to the North and from the States of Virginia, North Carolina, South Carolina, Georgia, Maryland, and perhaps from as far North as New York and the granites of Connecticut. It is in this region that the Florida minerals are found in original deposits.

Little by little throughout millions of years these tiny grains of sand found their way from mountain by wind, rivers and streams, ocean tides and currents, storms, and perhaps, by subterranean streams to their resting places on the beaches. Nor is their bed, even now a permanent place of perpetual rest, because in every storm they become swept from deposits to become churned again and mixed with the sands of the shores.

The heavy storm in Florida during the last Season (1947) completely obliterated some of the richest of the deposits on the Coast and left nothing but a completely churned-up mass of sand and mineral to be again separated by the never silent waves.

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THEY PAVE ROADS WITH JASPER IN KENTUCKY

By PETER ZODAC, Editor
Rocks and Minerals

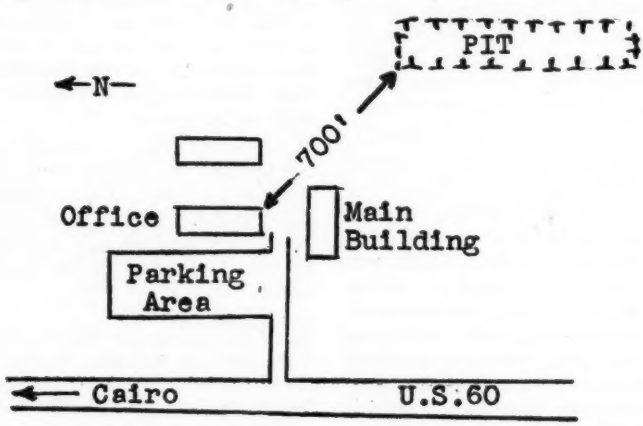
One of the most enjoyable trips I ever made was to Cairo, Illinois, where I was the guest for five days of Col. and Mrs. Fain White King. Not only are the Kings the most gracious of hosts, but being mineral collectors, my stay was unusually interesting and delightful. On the second day of my visit, Mon. Oct. 27, 1947, a trip was made to the Ancient Buried City, at Wickliffe, Ky., a few miles south of Cairo.

Ancient Buried City

The Ancient Buried City is one of the most fascinating spots in America. It is the site of a series of excavations of a group of prehistoric mounds, all now covered by wooden buildings. The site was discovered in 1932 by Col. King, who, with his wife, Mrs. Blanche Busey King, began to excavate the mounds with most amazing results—for excavations soon showed that it was an ancient buried city filled with hundreds of skeletons of the ancient mound builders plus thousands of artifacts such as pottery; flints; banner stones; beautiful jewelry made of fluorspar, bone, and copper; pipes and agricultural instruments; carved animals, birds, and human figures; strings of beads; ashes of hearth fires; etc. The skeletons, as excavated, are left exposed to view, each on a little mound of earth, while the artifacts are displayed in glass cases. One could spend many pleasant hours in examining the large number of exhibits. In 1946, the Ancient Buried City (long a tourist's attraction) was donated by Col. King to the Western Kentucky Baptist Hospital which is continuing to cater to the tourists. Mr. and Mrs. Robert P. Stratton, a very friendly couple, are in charge of this historic site. Wickliffe (on U. S. 60), a little village of about 1500 pop., is in western Kentucky (in southwest Ballard County) about a mile south from where the Ohio River empties into the Mississippi.

Jaspers at Ancient Buried City

Just as I stepped out of the car, in the parking space at Ancient Buried City, I stopped in astonishment at what laid around me. I looked to the right, to the left, ahead, and then for good measure, in back. I rubbed my eyes—was I seeing things? For the parking area was strewn with pebbles of brown jasper! Not a handful, or a few hundred, but by the thousands!—it had been dumped as gravel, many inches thick! I stooped and picked up a handful. It was all good



Rough Sketch (not to scale) of Ancient Buried City, including pit, on the northern outskirts of Wickliffe, Ky.

solid jasper of excellent gem quality!

The first thought that entered my mind, after I came to, was that the Colonel, knowing my interest in pebbles, was playing a trick on me and had purposely dumped a load of jasper for my benefit. But as I walked over the terrain and saw brown jasper everywhere (nothing but brown jasper and in large amounts)—in the fields, in paths, and used as gravel for road fills—I soon knew it was no trick but a miracle—an enormous deposit of brown jasper was somewhere in the neighborhood. I could stand it no longer.

"Where in the world did these pebbles come from?" I asked the Colonel.

"What are they?" he queried back, noticing my amazement.

"Jaspers, and mighty good ones."

"Jaspers! I thought they were just common ordinary pebbles and never paid any attention to them."

For the information of our readers, Col. King (a mineral dealer) is interested chiefly in fluorescent minerals in general and fluorite in particular, (the largest fluorite mines in America are near Cairo) and he has one of the largest stocks of both items in the country, if not in the world.

The jaspers came from a nearby gravel pit to which the Colonel took me. It was located 700 feet southeast of the office. The pit was opened up about 10 years ago and was never worked before or since. It is 500 feet long, 100 feet wide, and 25 feet high at its highest face—most of the gravel (all JASPER) was used by the highway department for road fill.

The jasper is still present in the pit in enormous masses as consolidated gravel (huge mass of pebbles extending for hundreds of feet and cemented together by nature). The jasper varies from small up to 3x3 inches, rounded brownish pebbles which form about 99per cent of the consolidated gravel which is from 6 to 8 feet thick (perhaps even thicker), horizontally bedded and covered by a 20 foot deposit of brown loess (fine grained loamy clay). A few tiny grains of glassy to milky quartz are also present with the jasper and all cemented together by dark brown limonite—the limonitic cement is not too strong as the pebbles break out easily. The jasper is so plentiful, as has already been mentioned, that it is used as road fill, like ordinary crushed stone, and in a number of places one could pick up good jasper by the shovelful. From an examination of a number of large broken pebbles, it appears that they are replacements by brown jasper of grayish chert.

A broken section of a jasper pebble (found in the pit) exposed a tiny geode which was lined with fine drusy quartz (slightly brownish).

Roads paved with jasper

All along U. S. 60 for miles (from Wickliffe) to Paducah and beyond, the gravel used in the concrete road was brown jasper and especially was it noticeable in the shoulders of the road where it was lying exposed and loose. Through Ballard McCracken, and Livingston Counties, the jasper could be seen in the road. At a little hamlet called Future City, in McCracken County (3¼ miles east of the Ballard-McCracken County Line) a pit bordering the left side of U. S. 60 (200 feet long, 100 feet wide, and 10 feet or more high) showed much brown jasper. The airport, near Paducah, Ky., was covered with thousands of brown jasper pebbles.

In Cairo, Ill., jasper is used in Concrete Construction

Cairo, Ill., is a beautiful little city of about 15,000 pop., at the extreme southern tip of the State (in southeast Alexander County at the junction of the Ohio and Mississippi Rivers). A walk through the business section soon enlightens a mineral collector that the main ingredient of concrete construction is brown jasper—you see brown jasper in sidewalks, curbs, walls, and buildings; you also find jasper as loose pebbles in the terrain in and surrounding the city. No other mineral seems to be present. Col. King told me that the jasper is dredged out of the Ohio River, near Cairo.

Jasper near Evansville, Ind.

At the airport near Evansville, Ind., (in southwest Indiana, the city is on the Ohio River), I found brown jasper as loose

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pebbles in a parking area but they did not appear to be plentiful. I had only about 10 minutes to look around (my plane stopped there for that length of time) so it gave me no chance, really, to do any examining.

Origin of the jasper

At Cave-in-Rock, a little hamlet in southeastern Illinois, on the Ohio River, there are huge exposures of limestone bordering the northern bank of the river. In the many loose blocks of this limestone some of which were lying in the river, are large masses of grayish chert whose exposed surfaces are dark brown (being replaced by jasper). Some had only a thin veneer of the brown jaspery coating while others had it much thicker and grading into jaspery chert. Practically all chert masses seen had rounded edges. It seems only too evident that the loose jasper pebbles which are so common around Wickliffe and elsewhere are replaced masses of chert from limestones which have long since disappeared and the smaller the pebbles the better gem quality is the jasper. Though these pebbles extend for many miles, the best quality and the most numerous are to be found at the Ancient Buried City in Wickliffe, Ky. Incidently Mr. Stratton is a member of the R&MA. So go to Wickliffe, visit the fascinating site, meet the Strattons, and get yourself a "load" of Kentucky's fine jasper.

It might be mentioned in passing, that no rock, of any kind, was seen in Cairo, Wickliffe or vicinity while the predominate mineral noted was brown jasper.

Fossils and Minerals from India Reach Chicago Museum

The department of geology at Chicago Natural History Museum has recently received from India a shipment—delayed since 1945 first by the war and then by other overseas situations—of about 4,000 invertebrate fossils and a series of ores and minerals relating to economic geology it is announced by Col. Clifford C. Gregg, director.

The fossils were collected by Dr. Sharat K. Roy, chief curator of geology, at that time on a leave from the United States Army Air Forces in which he was a captain in the India-Burma theatre, from three localities in the Salt Range of the Punjab. The economic geology material was collected in various localities of eastern India.

Relatively few fossils from the locality in which Dr. Roy made his collection are to be found in American museums. They are in sufficient quantity to permit their study as series for the purpose of gaining an understanding of variability in any species and for expanding knowledge of evolution from the early invertebrates.

COAL IN NOVA SCOTIA

by SAMUEL C. BROWN

Stamford, Conn.

Some years ago the writer spent a short vacation in Nova Scotia, Canada.

It was in the Digby section near the shores of the Bay of Fundy, and like all places he has visited, browsed around for rocks and minerals.

Not far from the hotel that we were stopping at, I ran across an outcropping of a dark colored shale ledge. On close examination, I noticed there were layers of brown coal in the ledge which, although not very thick, furnished fair specimens.

This ledge was approximately at a dip of a 20 degree angle. I looked for fossil leaf impressions in it but failed to note any.

I was informed by a native that a mile or so from Digby the coal seams were much thicker and had been worked and used by the residents for home use.

While rambling along the beach at Digby, I picked up several water worn pebbles of citrine, smoky quartz, amethyst (pale), black tourmaline, and zircon crystals.

THE GEOLOGY OF LOWER MILFORD TOWNSHIP LEHIGH COUNTY, PA. (Part 3)

By CHARLES W. BROWN
Muhlenerg College, Allentown, Penn.

The Allentown Formation

The Allentown formation consists of dense bluish-gray to gray magnesian limestones in beds of six to eighteen inches. There are shaley beds present as in the Tomstown formation, but they are much thinner and less common in the Allentown. The most striking characteristic is the alternating dark and light bands in the weathered outcrop. This is due to varying amounts of carbonaceous matter and in part to varying amounts of magnesian carbonate.

Oolites are conspicuous as distinct layers or lenses and also as isolated grains ranging in size from microscopic to spherules like buckshot. Some specimens will reveal rounded grains of quartz, which are thought to have been rounded by heavy wind action before being blown into the water in the manner that beach sand is blown out to sea from nearby land. On a fresh surface the limestone is gray but weathering turns it to brown as a result of the decomposition of contained pyrite.

Ripple marks, mud cracks and edgewise conglomerates are common in the Allentown, and again we are led to believe that it was of shallow water origin as was the Tomstown.

A microscopic examination of the limestone reveals little other than calcite, dolomite, quartz, sericite and carbonaceous matter with occasional crystals of pyrite. B. Frank Buie made a microscopic study of the insoluble residues and found that quartz was the only mineral recognizable in the grains that failed to pass through a 200 mesh screen, but in the finer material he identified feldspar, zircon, tourmaline, rutile, cyanite, corundum, garnet, topaz, pyrite, galena and possibly fluorite.

Calcareous algæ are abundant in the Allentown. They have contributed largely to the formation of many beds and are found at different horizons, but they are all classified as "Cryptozoon proliferum". Among the "working class" of geologists, we simply refer to this criteria of the Allentown as "Cryptozoa". A few specimens of the brachiopod "Lingulepis acuminatu" have been found along with the Upper Cambrian trilobite "Solenopleura jerseyensis" that was associated with abundant "Cryptozoa".

The Brunswick Formation and Associated Igneous Rocks

The Brunswick formation is made up of a series of shales, sandstones and conglomerates and in the immediate area we have all three present. Being along the margin of the Newark trough, Lower Milford township affords excellent examples of the "Fanglomerates" which were formed in the flood seasons of the Triassic period. Ordinarily we find the usual shales and sandstones in predominance in the trough, but that is not the case here. The fan material consists of stones of all sizes up to at least two feet in diameter, embedded in a red clayey matrix. In some places, the stone is chiefly sandstones, but in others, it is primarily limestone. Occasionally these two types are uniformly mixed. The sandstone pebbles are well rounded, giving evidence of being transported over considerable distance. They resemble very closely the sandstone of the Shawangunk formation and may well have been broken off from beds of that formation that were exposed at that time. The limestone fragments are mostly angular, indicating that they come from near the margin of the trough. In lithology and in their rather low magnesian content, they resemble the Devonian limestones which are now exposed far to the north of Lehigh County.

The shaley member of the formation is essentially a soft red shale which owes its color to the presence of colloidal hematite. However, southwest of Palm, the red hematite has been transformed into black magnetite through contact metamorphism when the molten diabase was intruded into

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the formation, and this dark gray rock is known as hornstone.

Along the diabase ridge south and east of Hosensack, the fan material has been metamorphosed, producing a very interesting problem. When presented with a hand specimen, one sees little more than a quartzite conglomerate, but when the entire rock fizzes readily under HCl, we have to stop and begin to consider the case and all its possibilities. E. T. Wherry's explanation includes the introduction of calcium-bearing silicates into the fan material by the magma as it cooled. Also, there is the possibility that the original material was merely a mixture of fine sand and limestone pebbles, and that the calcareous weathering products permiated the rock, and the sandy material was transformed into a quartzite when the magma was intruded.

B. L. Miller's analysis of the diabase in the Newark Group shows it to be made up of interlacing laths of plagioclase feldspar, showing under the microscope extensive twinning and optical properties indicating it to be labradorite. In the interstices between the feldspars, there is a large amount of augite and minor amounts of biotite, magnetite and rarely a few other minerals. Generally the texture of the diabase is coarse enough for one to be able to discern the individual crystals with the naked eye, but in spots near the fringe of the dike where the magma cooled rapidly, the rock is fine-grained like basalt.

The fresh diabase as exposed in road cuts and quarries is a hard, tough rock of greenish-black color that exhibits abundant jointing. The weathered surface is a bright rust-yellow due to the weathering of augite into colloidal ferric hydroxide. Boulders of the diabase accumulate in great quantities upon weathering and the formation can be traced by the presence of these boulders in woods and fields.

* * * Structural Geology * * *

Structural geology is perhaps the most important phase of this highly intricate science of geology. Upon a correct interpretation of the structure of an area depends the success or failure of mineral enterprises, water problems, and petroleum projects. It is in this particular realm of study that the geologist's detective ability is tried to the utmost in piecing together loose threads of information to make the complete whole logical and understandable.

In explaining the structure of Lower Milford township, in which the Triassic border relationships are of paramount interest, it is necessary for the reader to have in hand the field map, on the back of which is the key to the color scheme used in all the diagrams, the block diagram of the township, and the three cross-sections which were made along the dotted lines indicated on the field map.

Cross-section AB shows a graben fault of considerable extent where a block of the Allentown limestone has been dropped down into direct contact with the pre-Cambrian Byram gneiss. The streams in the immediate vicinity flow along the fault line for a good distance, and it was this criteria that the author used to determine the limits of the fault as the swampy terrain gave little evidence in the form of outcrops to show the fault contact. The abrupt change in float material from Byram to Allentown limestone further aided in making this line of demarkation definite. Traveling further to the southeast, we find that the entire terrain is made up of Triassic fan material. The contact between this formation and the Byram is easily traced by the typical red soil that is common to the Brunswick formation. The fact that the Hardyston formation underlies the Triassic from Corning to Hosensack and on up the Hosensack Creek valley, leads the author to believe that it also is present below the surface along the line AB. The Hardyston also underlies the Triassic between Center Valley and Blue Church farther to the northeast of Lower Milford township. The presence of the Tomstown formation east of Hosensack in the creek valley, and the fact that it underlies the Triassic farther to the north near Leithsville, gives vent to the possibility that it also underlies the Triassic along the cross-section AB. It can be said that

Fig. 1. Block diagram of Lower Milford Township, Penn.

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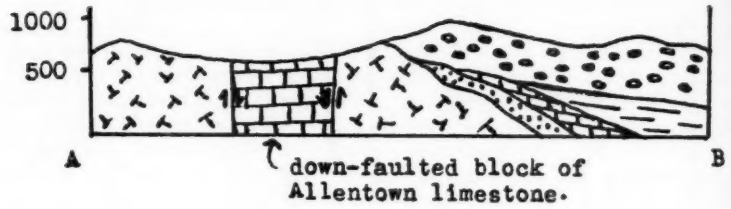

Fig. 2. Cross-section AB

the Triassic rests unconformably on the Cambrian and pre-Cambrian rocks. The various fault theories concerning this relationship are substanciated by good evidence to the southwest and far to the northeast, but the evidence present in the immediate vicinity does not indicate that such is the case here.

Along cross-section CD we run into a serious fault problem east of Hosensack. Due to the lack of evidence and limited outcrops, we find that few geologists have arrived at the same interpretation of the situation. I have tried to formulate a relatively simple theory concerning the problem. I believe that the faulting is only local, and that it took place prior to the deposition of the Triassic sediments. The manner in which the Tomstown formation is distorted leads me to believe that there was great compression which forced up a block of pre-Cambrian material. Subsequent erosion has removed all but the Byram contained in the fault block, and the Hardyston and Tomstown surrounding the block remain in their distorted attitudes. The Hardyston shows evidence of metamorphism, and I believe that we can attribute the manner in which the Tomstown reacts to HCl to this metamorphism. We also see the small basins of Hardyston in the Byram, and how they constitute the small stream valleys. Again we have the Triassic resting unconformably on the Paleozoic and pre-Cambrian material, however, there is also present the basic intrusions that came at the close of the Triassic. These intrusions metamorphosed the material in their immediate vicinities, and together they form the ridges of more resistent rock in the Triassic.

The stratigraphic column in Fig. 4 is included merely to shed further light on the sequence of events in the geologic history of Lehigh County as a whole. As one can see when comparing the structure diagrams with the stratigraphic column, there are gaps in the area under study whereas there are formations which fill these gaps in other parts of the county. Deposition was not uniform throughout the county, and neither was erosion. These two factors, along with the occurrence of the Taconic Revolution at

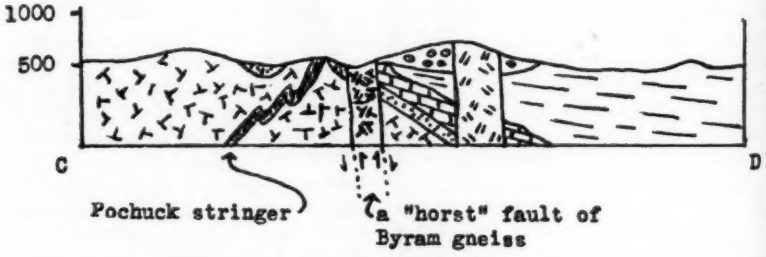

Fig. 3. Cross-section CD

the close of the Ordovician, and the Appalachian Revolution at the end of the Paleozoic, cause the area to be one of extremely complex geology.

* * * Economic Geology * * *

Little can be said for metallic products yielded up by the earth in Lower Milford township. Mining operations are past history everywhere in the county, and only a few old excavations were seen in the field in the area under discussion. Iron mining was more extensive in the township to the north in the vicinity of Sigmund, but there is evidence that there were operations at one time in the small stringers of Pochuck gneiss southeast of Dillingerville and east of Bald Hill.

On top of Limeport Hill, between Limeport and Vera Cruz Station, there is the remains of an old graphite mine that has long been out of operation. The mine was originally opened up as a gold and pyrite enterprise, but soon folded up with many men losing a great deal of money.

Only two limestone quarries, now out of operation, are present in the township. One is the Limeport Quarry in which is the exposure of the famous unconformity between the Allentown limestone and the Martinsburg shale, and the other is in the highly calcareous phase of the Tomstown east of Hosensack. There is a small pit one mile east of Dillinger Station from which little limestone has been taken for probable building purposes. It is now filled with refuse, and an outcrop is extremely hard to find. Southeast of Limeport, in the down-faulted block of Allentown limestone, there is a small excavation in the middle of a plowed field. It is highly improbable that anything more than a little building material was taken out of it.

Small sand pits are abundant in the Byram gneiss. Around the base of Chestnut Hill the state highway department removes material from these pits, and uses it as road fill and sand to mix with cement.

The Hardyston formation provides an excellent supply of road fill and gravel. Pits located about a half mile northeast of Corning and at Hosensack are in operation, and the local roads are filled with the material. It is used primarily on dirt roads to keep them navigable despite the spring thaws. The Triassic fan material is also used for this purpose, but there is no evidence of any extensive quarrying going on in the trap rock of the area. In many of the old farm houses one can see that blocks of Pochuck, Byram, lime-

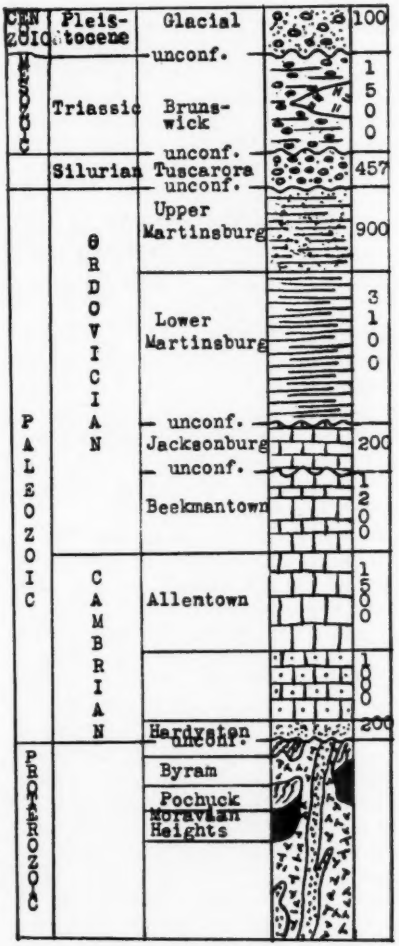

Fig. 4. Stratigraphic Column of Lehigh County, Penn. (after B. L. Miller).

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stone, conglomerate, and diabase have been used advantageously as building material rather than having been just discarded as most field stone is. This situation is purely one of local character, and the proximity of a formation is indicated by the presence of these stones in the construction of a house, barn, or wall.

The red shales, sandstones, and conglomerates of the Triassic in the southeastern portions of Lower Milford township contain sufficient ground water for domestic purposes. Almost every well will yield some water, as ground waters percolate through the joints and between the beds of shales or through the fine, to coarse grained sandstones and conglomerates. In a general way, the deeper the well the more extensive is the gathering ground and consequently the greater is the yield. Some wells 25 to 50 feet deep may furnish sufficient water for a single household, but in other places it may be necessary to drill to a depth of 150 to 200 feet. The water obtained is almost uniformly low in dissolved mineral matter.

The diabase in the region is too limited in extent and too dense to be of any importance as a source for underground water.

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QUARTZ CRYSTAL CASTS AFTER ANHYDRITE FROM PATERSON, N. J.

By MERTON McKOWN

114-20—146th Street, So. Ozone Park, N. Y.

During the past few years *Rocks and Minerals* has carried a number of articles on some unusually interesting minerals that have been found in the Paterson, N. J., trap rock quarries. Here is a report on one unusually interesting specimen which I found last year.

Last summer, in company with Mr. T. O. Lisle, of Flushing, N. Y., I made two trips to the Prospect Park trap rock (basalt) quarry, in Paterson, N. J., where a number of interesting minerals were found. On the north side of the quarry I found quartz casts with gmelinite; on the west side I ran across an oval-shaped pocket which contained drusy quartz crystal casts after anhydrite. The casts were about the size of a pencil, up to 3 inches in length, and their shape would indicate that the anhydrite was of uniform thickness throughout its length. Another interesting feature was that some casts showed parallel growth, about 4 inches wide.

Many single crystals of calcite (modified rhombs) were scattered among the quartz and on their edges these crystals showed a pale green fluorescence. (It is interesting to note that several years ago I collected at the quarry a prehnite specimen encrusted with drusy calcite and one large calcite crystal in the center of the druse fluoresced red.)

The anhydrite cavities are about 3/32" in diameter but most of them were filled with silica. The upper side of all specimens collected were coated with a light brown deposit which could be removed with an application of oxalic acid.

The accompanying picture, taken by Mr. Harry Knapp, is a good illustration of the quartz crystal casts after anhydrite.

Editor's Note: The trap rock quarries of Paterson, N. J., are famous for their wide range of unusually beautiful and intensely interesting mineral specimens. Crystal cavities (casts, moulds, etc.) are so numerous and fascinating that a special report on them was issued in 1932 by the U. S. Geological Survey: "The Crystal Cavities of the New Jersey Zeolite Region," by Waldemar T. Schaller, Bull. 832, Washington, D. C. The illustrations (33 of them) in this 90-page report are so unusually good that if no text accompanied them they alone would be of intense interest and value to mineral collectors.

Drusy quartz crystal casts after anhydrite crystals which are about the size and shape of a lead pencil. A few calcite crystals are also present and they fluoresce a pale green on edges showing a zonal effect. Specimen picked up at the Prospect Park Quarry, Paterson, N. J., during mid-summer of 1947.

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A VISIT TO THE IVIGTUT (GREENLAND) CRYOLITE MINE

By JOHN SINKANKAS

Commander, U. S. Navy

During the summer of 1942 while on duty with a U. S. Navy patrol seaplane squadron in the North Atlantic, it was my good fortune to have visited the unique cryolite mine at Ivigtut, Greenland. The days after my arrival in Greenland, I flew over the mine but it was several months before an opportunity came to actually set foot upon the shores of Arsuk Fjord where the mine snuggles against the towering back-drop of glacier-festooned mountains. Finally the day came; I was selected to fly an important Army officer to the little settlement surrounding the mine.

The day of the trip was clear and cloudless, a typical Arctic day in summer. The flight and landing in the waters of the fjord were uneventful but when we attempted to anchor the seaplane, we found serious difficulties. Our first attempt at anchoring close to the mine itself resulted in near disaster as the plane drifted into shore with dead engines and the patent anchor only holding momentarily upon the smooth rock bottom. We started engines before beaching however, and in desperation, moored to a ship's buoy whose vast size almost dwarfed the nose of our Catalina. By approaching very slowly we did moor to it without suffering more than a slight dent in the fragile nose of the hull.

This little experience with anchoring showed me the whys and wherefores of the system of oreloading practised at the mine. The fjord waters are so deep and the bottom so smooth that the construction of conventional piers would be impossible. As a consequence, vessels being loaded with cryolite are obliged to moor to two large buoys just off-shore from the mine buildings. The buoys hold the vessel in position under an overhead tramway from the mine breaker house. Trolley cars of mineral are sent out on the tramway and tripped automatically over the cargo hatches of the ship which is thus loaded directly and efficiently.

The mine proper is located immediately adjacent to the fjord waterline, in fact, the ore body extends under the bay at this point and a seawall is installed above to keep extraordinary seas from breaking into the workings whose bottom is now considerably below sealevel. Although the waters of the sea are only separated from the mine by a rather narrow wall of ore, no flooding was noted and, I was informed, none had ever occurred. The mine and accompanying buildings are located on a relatively level indentation in the side of the bay; it is fortunate that this is the case since the difficulties of exploiting this mineral resource would have been insurmountable otherwise.

From all indications, the cryolite ore is concentrated in a watermelon shaped mass that appears to be expanding with depth. The upper part of the mass had a relatively small surface outcropping when first explored. The method of mining is simplicity itself, the cryolite being quarried out as in any open-pit quarry. The breaker house is connected to the floor of the pit (about 150' deep) by an elevator which hoists the loaded cars to the upper level of the house. Culling of impurities is apparently not necessary because of the amazing purity of the ore which needs only to be transferred "as-is" into the waiting ship.

In regard to the mineral itself, cryolite is a sodium-aluminum fluoride, with a hardness of only 2.5, a quality which considerably cheapens the cost of extraction. It is usually colorless or white but was observed frequently in smoky and brown shades. The smoky specimens were strikingly similar, visually, to masses of smoky quartz. The mineral is very easily fusible even in a candle flame and possesses an index of refraction closely approaching

that of water. These two marks of identification gave rise to an interesting belief which was long cherished by the Eskimos of this locality. They believed, until the advent of the white man, that cryolite was petrified ice that somehow had lost its ability to thaw. When one considers that this material in clear sections can be immersed in water and practically disappears from view, and furthermore can be melted in a feeble candle, flame, it is no wonder that such a belief was held.

As minerals go, cryolite is rare, the only other occurrences of note being in Russia and in Colorado where small quantities have been found in the past. Cryolite is used commercially in the extraction of aluminum, for chemical purposes, and for certain ceramic uses. It finds its chief value however in the smelting of aluminum where it provides a flux in the electrolysis of alumina. In Greenland, the ore sold from Ivigtut contributes substantially to the financial support of this Danish colony.

Although the cryolite is very interesting by itself, it is the accessory minerals at Ivigtut that arouse the interest of the mineralogist. As is common with so many mineral masses, the Greenland cryolite body is surrounded by an envelope of contact minerals. The ore-body and its envelope are embedded in a light gray granite which shows considerable variation in composition as the cryolite mass is left behind until it resumes the appearance of the vast quantity of surrounding rock. The envelope, parts of which were excavated in order to increase the opening to the mine, was capped with a gossan of quartz, siderite and other minerals. Limonite was very much in evidence. This portion of the mass was dumped off to one side of the mine and as soon as I had convinced myself of the dullness of the extremely pure cryolite, I left the mine in favor of the dump. While the dump was of modest size, it was so full of interest that I could have spent a whole year upon it with profit. It was indeed a collector's dream—tons of contact zone minerals.

Large boulders of siderite were most conspicuous, this mineral being crystallized in very large rhombohedral cleavage masses. Masses of crystals measuring six inches or more on edge of a cleavage were not at all rare. Because of its weight, I contented myself with a siderite rhombohedron of about six inches on edge, however splendid masses of pyrite and galena were taken along as well. This locality is noted for fine crystals of columbite but unfortunately for me, I couldn't find any individual crystals but only crystalline masses. Fluorite was observed but in small quantity. A list follows below of the minerals collected and collectible at this locality. This list is by no means complete.

Cryolite: colorless, white, brown, black, crystalline masses.

Galena: usual crystalline masses.

Pyrite: usual crystalline masses.

Quartz: milky, in intertwined crystals, observed specimens from the gossan much decomposed.

Columbite: black crystalline masses with brilliant sub-metallic luster.

Siderite: honey-colored rhombohedral masses.

Lepidolite: in small flakes.

Also found but not by the author:

Cryolithionite, chiolite, pachnolite, thomsenolite, gearksutite, ralstonite.

NOTE: Minerals collected at this locality by the author were presented to the Paterson, N. J., Museum in 1943. When last heard of they were still on exhibit.

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SPECKS IN NEW LOCATION

Mr. and Mrs. J. E. Speck have sold their farm near Warsaw, Mo., and located at Fox City Geode Trails east of Kahoka, Mo.

Mr. and Mrs. Speck formerly lived in Phoenix, Ariz., and will be remembered by many rockhounds for their excellent collections of m-m and t-n.

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PETOSKEY STONES

By PHILIP R. SCHNABEL
Cuyahoga Falls, Ohio

(Editor's Note: The author of this little article, Mr. Schnabel, died suddenly on March 13, 1948, and so never lived to see his first article in print. He was a member of the R&MA for many years.)

Some 50 odd years ago I got acquainted with an old Indian who used to hunt Petoskey Stones, polish one side, and sell them to tourists. I used to go out with him to hunt for these stones, not that I ever did anything with them but I enjoyed the collecting. This was my first introduction to Petoskey Stones and they fascinated me so much that I hunted them every summer ever since.

About 6 years ago I found the largest, solid one I ever saw or heard of—it weighed 17½ pounds. As I had seen a number of onyx spheres made by some of our club members (Akron Mineralogical Club), I wanted one made of my large Petoskey Stone. I bought an old washing machine and made a polishing machine out of it to work on the sphere; when finished the sphere was 5⅝" in diameter and within .002 inch of perfect. This sphere gave me the bug and I began to cut and polish minerals in earnest. I now have over 600 specimens in my collection and 100 spheres. Each sphere is of a different material (about 75 more spheres in the making are now cubed out and ready for grinding and polishing).

Petoskey Stones are fossil corals of the genus Prysmatophyllum. So far as I know, they are found only in Michigan and my best collecting area (where I found the 17½ pound specimen) is on Little Traverse Bay, just north of Petoskey in southern Emmet County of northern Michigan) where they occur as loose

The large sphere of Petoskey Stone, 5⅝" in diameter cut from the 17½ lb. boulder that was found on the shore of Little Traverse Bay near Petoskey, Mich.

pebbles on the beach. I have found them on the north side of the bay but not on the south side. Because they were first found around Petoskey is how the name Petoskey Stone originated; they have since been found in other parts of the state. I have found them around small lakes and gravel banks around Petoskey and also along the shore of Lake Huron. Some are also found in the cement mines near Petoskey but they are a different variety.

Editor's Note: The following information reached us too late to call it to the attention of Mr. Schnabel but it is added herewith for the interest of our readers. The Pelletts[1] found the best collecting of Petoskey Stones along the Lake Michigan shore of Charlevoix County north from the town of Norwood. Here in the beach deposits they found pieces of the limestone coral ranging in size from pebbles to those too large to move.

[1] *Petoskey Stones*, by Mary L. and Ralph T. Pellett. Mineral Collecting in the Lower Peninsula, 1947 Annual of the Michigan Mineralogical Society, Cranbrook Institute of Science, Bloomfield Hills, Mich., pp.10-11.

Albanese' Price List of Franklin, N. J., Minerals

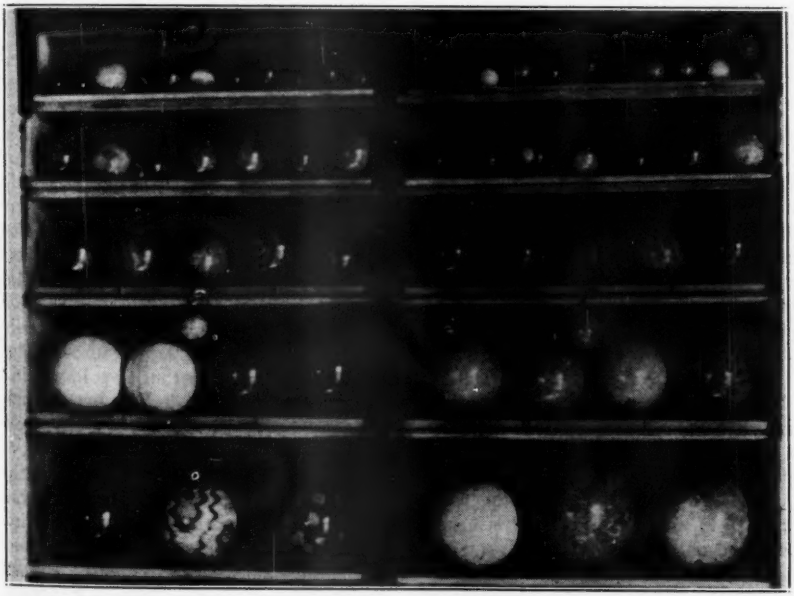
One of the longest price lists on the minerals of Franklin, N. J., that we have ever seen, has recently been released by John S. Albanese, P. O. Box 536, Newark 1, N. J. The price list consists of 6 standard size pages and offers for sale 82 different minerals from the world-famous zinc mines. The minerals are arranged alphabetically.

Grieger's 1948 Spring Supplement

Grieger's, of 1633 E. Walnut St., Pasadena 4, Calif., have just released a 1948 Spring Supplement to their 15th Anniversary Catalog. It contains pp. 54-71 and features chiefly lapidary equipment and supplies with many fine illustrations.

Burminco Issues New Catalog

Burminco, of 128 So. Encinitas Ave., Monrovia, Calif., have just released their new loose-leaf catalog. It consists of 33 pages and is devoted to choice mineral specimens arranged alphabetically.



Some of the many spheres in the collection of Mr. Philip R. Schnabel which he, himself, had cut and polished.

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HUGE FOSSIL GIFT TO CHICAGO MUSEUM

Announcement of the gift, by the University of Chicago, of one of the greatest collections of prehistoric animal skeletons in existence, to Chicago Natural History Museum was made Feb. 21, 1948, by Col. Clifford C. Gregg, director of the latter.

The collection, for years housed on the campus of the university, contains approximately 8,000 fossil specimens collected over some fifty years and valued in excess of $100,000. Included are some 2,000 specimens of prehistoric fishes, 5,000 of amphibians and reptiles, and 1,000 of mammals.

The university is transferring the collection to the museum so that its educational benefits may be extended to a wider public than was possible at the university. The museum already had a paleontological collection of its own which was one of the world's finest, and the additions coming in this gift, covering chiefly fields in which the university specializes and which were not adequately covered in the museum's former collections, will provide a united and rounded out collection which will have few rivals in the world.

The gigantic task of moving the collection—the biggest moving operation both in quantity and value since the museum (at that time known as Field Museum of Natural History) as a whole was moved from its original home in Jackson Park to the present building in Grant Park (Chicago, Ill.) in 1920-1921—was begun Thursday, Feb. 19, and will extend over a considerable period.

Some of the material will be moved directly into Ernest R. Graham Hall of Historical Geology at the museum for immediate exhibition; still other parts will go into the museum's study collections for the use of research scientists and students. Thus they will continue to be available to the University of Chicago classes in paleontology which for some years have been holding part of their sessions at the museum to take advantage of the museum's collections and to hear lectures by members of the museum staff who have been appointed as associates on the faculty of the university, Col. Gregg stated.

The university collection is primarily representative of North American late Pennsylvanian (250 million years ago) and Permian (215 million years ago) amphibians and reptiles, and South African Permian and Triassic (119 million years ago) faunas.

Included are many of the highly important mammal-like reptiles, a notable series of fossil fishes, chiefly Paleozoic (215 million-plus years ago) and a goodly number of North American Tertiary (7 million to 55 million years ago) and Pleistocene (one million years ago) mammals.

"The specimens included in the University of Chicago collection, and the studies made of them by professors of vertebrate paleontology are of the utmost importance to our understanding of vertebrate evolution," says Bryan Patterson, curator of paleontology, at Chicago Natural History Museum.

"The fossil mammals donated by the university supplement and to some extent complement those already in the museum," Mr. Patterson said. "The remainder —and the greater bulk— of species in the university collection was previously unrepresented here. The university has concentrated its field activities on the late Paleozoic and early Mesozoic (95 million to 119 million years ago) whereas the museum has worked almost exclusively in the Cenozoic (one million to 55 million years ago) and later Mesozoic. The university gift is a further step in the integration of effort of the two institutions in the field of paleontology. The advanced teaching in vertebrate paleontology, now carried on in the museum, will be greatly facilitated by the merger. The general public will also benefit. The university collection, although appreciated by specialists the world over, remained almost completely unknown to layman Chicagoans. Its treasures will now be more readily available to them."

FREEDMAN ON BUCK CREEK, N. C.

By CHARLES A. BELZ, Secretary
Philadelphia Mineralogical Society

A collection of minerals could scarcely be called complete without at least a few representative specimens from the western part of North Carolina. This section has deservedly become a favorite vacation land for mineral enthusiasts, especially those who would consider any holiday, even one in this grand and exhilarating mountain country, a sheer waste of time unless there was some opportunity to search for specimens. Fortunately, this impressive stretch of the Appalachians including as it does the Blue Ridge and the Great Smokies does afford ample opportunity to combine in one medicine the nerve tonic which derives from a sojourn in mountain country together with the narcotic of good huntin' which is so indispensable to the real addict. A single vacation however long, would be too brief to cover to one's complete satisfaction the various well known localities often described. As a source of further vexation we learn of "workings" up in the hills, almost inaccessible and, without proper native escort, actually hazardous. A mineral collector in Pittsburgh or in Philadelphia may not look like a "revenoor" but in the hills, any stranger is suspected.

A locale, perhaps not too well known, in the far southwest corner of the State was described by Dr. Jacob Freedman of the Department of Geology, Franklin and Marshall College, Lancaster, Penna. to the Philadelphia Mineralogical Society,—that of Buck Creek, North Carolina. Dr. Freedman, as a member of the party from the U. S. Geological Survey, was engaged in extensive exploratory work in that area during the winter and early spring of 1945.

The primary object of this mission was to make a survey of corundum deposits in this area. Corundum was first discovered in 1870 at Corundum Hill, Macon County. Mining operations were begun the following year, were sporadic, and except for some activity during World War I, had long since been discontinued. After our customary imports from South Africa were cut off during World War II, new sources of this important mineral had to be found. The accelerated production of war munitions required an abundant supply of "snagging" wheels for coarse grinding of hard steels in a multitude of manufacturing operations. Snagging wheels can be made from artificial abrasives, but those from the natural corundum are at least 1/3 more effective. Unfortunately all corundum is not equally effective for this purpose even though it has the necessary hardness. That which has a rhombohedral parting is not so satisfactory for abrasives because on breaking up, it presents a smooth face to the work while the type of corundum which has a conchoidal fracture is excellent, since it always presents uneven and jagged faces as a cutting edge. It was for the purpose of finding this type of corundum that U. S. Geological Survey was engaged in exploration of the Buck Creek corundum deposits. At the same time the U. S. Interior Department, Bureau of Mines, undertook large scale exploration of this area by the reopening of old shafts, old cuts, and by trenching to bed rock.

Franklin, Macon County, might be considered the center or base of operations in this area. Dr. Freedman observed as a side remark that on the road from Franklin to Bryson City near the Shepherd Branch of the Little Tennessee River are found specimens of the beautiful mineral Rhodolite with its delicate shades of pale rose-red and purple, corresponding in composition to two parts of pyrope and one of almandite. It was first indeed identified from this area.

About twenty miles northeast of Franklin near Webster on the Caney Fork of the Tuckasegee River is the site of the old Chastains Mine. There is a tunnel, a shaft, and open cuts. The country rock is hornblende and a mica schist. Apparently the corundum came in along a strong fault;—as might be expected, there is a

great deal of vermiculite and the tunnel about fifty feet back from the entrance is blocked by a cave-in. The tunnel itself is in bad shape, all the timbering having decayed badly. The top of the tunnel in some places still clearly shows the pick marks from operations fifty years ago. The corundum is disseminated in the schist for a thickness of 8' to 10', can easily be distinguished in the open pits and drifts outside of the main shaft and can be picked up in the dumps in the form of nodules or barrel-shaped blocks of corundum sheathed in mica flakes. There is however not enough corundum at this deposit to warrant large scale operations.

About a mile and a half from Retreat, Haywood County, there is a small dunite-peridotite body with a 3" pegmatite dike bearing corundum pods and lenses residually enriched at the surface. Here again can be seen the barrels sheathed in vermiculite, but they are small and poorly developed.

Some ten miles east of Franklin on Ellijay Creek in Macon County there is what remains of the Mincey Mine. This location from reports seemed to be a good prospect, but after a critical survey, was also pronounced insufficient. There is badly weathered dunite in gneiss with bands of vermiculite easily friable. One shaft near the woods is caved in, and another shaft at a lower level is full of water. The ore is present as gray nodules in the gneiss, and is locally known as "Hard Tack", "Bronze" or "Pearl" corundum. When cut in cabochons, the better grades show pronounced asterism. Most of the specimens are found in the vicinity of the caved shaft.

Perhaps the best known of the corundum deposits is Corundum Hill, 8 miles southeast of Franklin. The formation consists of a large Dunite body in badly weathered sandy schist. There are numerous open cuts and tunnels, the largest of which is called the Houston Tunnel goes back more than 90 feet where it is now closed by a cave-in. The timbers have all been down since 1870, but here again pick marks are easily discernible in the roof. The area had been worked over thoroughly, but not until 1895 did they discover the main band of amphibolite and amphibole-gneiss containing abundant corundum for a width of 8 to 10 feet at the contact of the dunite and the schist. The ore occurs variously in solid masses as large as a man's head, known as "block" corundum; some as barrel-shaped "crystal" corundum, often with terminations, and the finer grains known as "sand" corundum.

Twenty-two miles southwest of Franklin and 21 miles northeast of Hayesville in Clay County is the site of the Buck Creek or Cullakeenee Mine. Here is perhaps the largest peridotite mass in the Appalachian belt, one and one-half miles long N.W.-S.E. and one half mile wide. The greatest part of the mass is dunite with local bands of amphibolite and peridotite. This area has been prospected thoroughly, but has never actually been mined. There are many spotty pockets where accidental finding of feldspar and hornblende intensified the search for corundum.

The approach is only a half-mile off the main highway. On the right across Buck Creek is the dump of the Big Shaft and an adit driven by the U. S. Bureau of Mines showing mostly feldspar, hornblende, and some gray, blocky massive corundum scattered in the feldspar. Much of it has been hand cobbed, but there is a considerable amount of it left.

To the left is the base of Red Corundum Knob with its summit 4000 ft. above sea level, and 800 ft. above the river. Most of the trenching and the old cuts are on the lower slopes of the Knob, but for the more enterprising ones, there are paths leading to the top. Most of the lower trenches show dunite altered to chlorite and serpentine with a consequent expansion in volume with numerous small scale faults or offsets. The cuts on the lower slope are most interesting showing excellent exposures 2 to 3 feet in the hornblendite dike.

The minerals of the lower slope are Anorthite in the pegmatite dikes; Zoisite in white to light gray bands associated with the pegmatite; Margarite as a faintly lavender mica; Olivine in the dunite; Enstatite, a primary ultrabasic mineral asso-

ciated with the dunite; Bronzite, Tremolite, Actinolite with the peridotite; Serpentine as an alteration of the dunite; the fibrous variety of Picrolite is found half way up the slope in a big open cut; Talc and Hornblende as an alteration product of the amphiboles and pyroxenes in the pegmatite dikes and hornblendite; finally gray and white Corundum in pegmatite dikes at the centers of chlorite-muscovite nodules and lenses, with an occassional rare specimen of a deep blue color.

There are many deep cuts at the top of Red Corundum Knob. The Bureau of Mines trenched deeply to locate corundum. There is considerable banding of amphibolite and troctolite in the dunite. The amphibolite is striking, occurs laminated to massive, and is tough. The rock is bright green, and is fine grained to coarse grained, and is classified as the amplible edenite. The green color is due to the presence of a small percentage of chromic oxide. The troctolite is striking, and occurs as olivine grains surrounded by anorthite with serpentine reaction rims.

The dunite is fresh and altered, but shows very little corundum.

Structurally the body of amphibolite-troctolite bands trends north-eastward, with pronounced W.N.W. faulting showing additional N.W. offsets. There are two theories to explain the formation of the amphibolite. First it was believed there occurred a separation of the olivine from the fluid magma by crystal settling, with a subsequent reaction by an alumina-rich residue. An alternative opinion is based on the observance that the amphibolite always seems to occur at the contacts between the dunite and troctolite, the inference being that alumina-rich solutions came up along the contacts and they altered the dunite.

The minerals at the top of Red Corundum Knob are Kyanite, along the cracks; the chrome spinel Picotite in the veins; fibrous and amorphous Sepiolite; and ruby and pink Corundum disseminated and in bands in the edenite only, never in the troctolite. Blocky and crystalline corundum is found in pockets in the pegmatite dikes. Dr. Freedman cited one pocket which yielded twenty such crystals in a weathered feldspar that were picked out as easily as picking them out of so much mud.

Dr. Freedman gave the impression that despite the energetic work of the U. S. Geological Survey and the U. S. Bureau of Mines, not enough corundum of suitable quality for use in snagging wheels was located in this area. In their comprehensive survey, these two agencies in their exploratory work probably mined all the worthwhile corundum in the whole area.

In Memory of

PHILIP R. SCHNABEL

Passed Away March 13, 1948.

Philip R. Schnabel, or "Phil" as he was known by his large circle of friends, was born on a farm near Cuyahoga Falls, Ohio, on May 10th,1876. Here he spent his boyhood days, working on the farm, attending grade and high school.

About this time the call of the West was getting in his blood, and this was natural as he always had a great love for the outdoors and the beauties of nature. Working as a hunter and cowboy for a while, he finally entered the service of the United States Rangers.

During his work as a Ranger, he became friendly with the Indians. They soon learned to respect him, and placed great respect in his given word. It was here that he started his collection of arrowheads, tomahawks and other Indian relics. Returning to Cuyahoga Falls, he opened the Tannery and Taxidermist Shop.

In later years he spent his summer vacations in his large cabin on Elk Lake in Michigan, and winter months found him in his shop in Cuyahoga Falls busy with his mineral hobbies and entertaining his many friends. His passing was a shock and great loss to all who knew him. And so—

Yes, we miss him so
As the time rolls by,
We don't understand,
We don't know why.

But there is a reward
At each trail's end.
We have gained so much
Just to call him Friend.

The sky is yet blue
And the sun will shine.
But how I will miss
That old pal of mine.

—H. A. Everhart.

RADIOACTIVITY IN MINERALS

By KEMPTON H. ROLL
Lead Industries Association,
420 Lexington Ave., New York, N. Y.

In 1895, almost a century before the atom bomb was considered a possibility and years before the discovery of the mysterious element radium, the famous French scientist, Henri Becquerel (beck-rel), observed a curious phenomena—the blackening of a photographic plate by a piece of mineral.

The plate, in a laboratory drawer and still in its original opaque paper wrapping, showed upon development that it had been exposed to something which had succeeded in blackening portions of it. Further tests with plates known to be clear and free from any accidental exposures to light showed that something in that drawer was responsible. The only other object with the plate was a specimen of an uncommon mineral called pitchblende from Joachimsthal, a town in Czechoslovakia. Surely an object such as this—cold, inanimate, emitting no visible light—could not be the cause of this strange phenomena! Additional tests convinced Becquerel beyond a doubt that this mineral possessed some mysterious property which was the cause. He rightly theorized that it must be emitting some unknown ray or rays. Known today as Becquerel rays, they are defined as the invisible radiations emitted by all radioactive minerals. Later Rutherford, Soddy and Fajans found that they consisted of three distinct radiations which they arbitrarily termed alpha, beta and gamma.

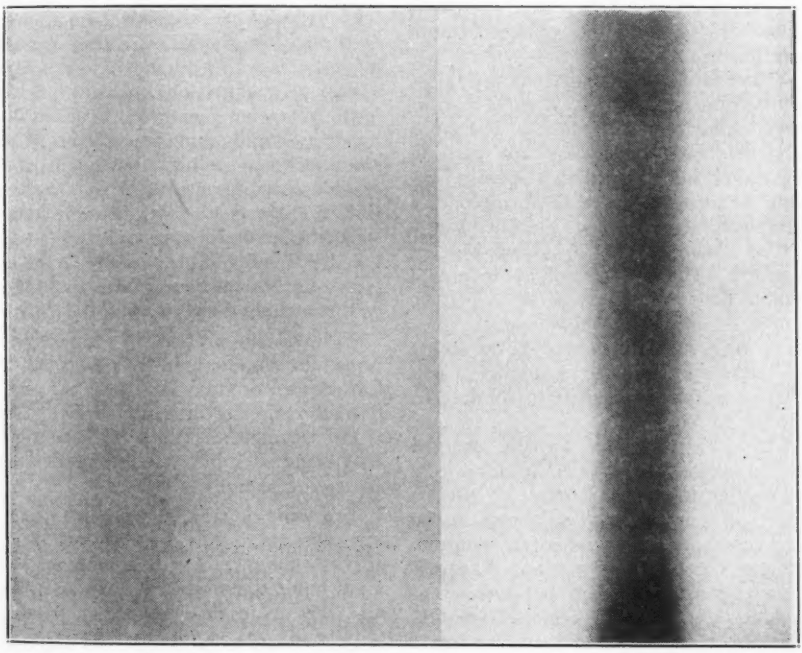
Among Becquerel's personal friends was a young couple known for their keen analytical minds and scientific curiosity, Marie and Pierre Curie. To this couple Becquerel turned over his notes and observations. Proceeding from where he left off, they managed, after years of heartbreaking toil and disappointment, to isolate the first tiny trace of pure radium. Marie Curie observed that the uraninite (pitchblende) she was working with possessed a much higher degree of radioactivity than that which would be expected from uranium alone. She correctly assumed that some other substance in the uraninite was contributing the excess radiation. It was this substance that we know today as radium, a million times more radioactive than uranium!

But the story of radium is familiar to all. Becquerel's experiments, on the other hand, are of interest to the mineralogist, particularly today when so much popular and strategic emphasis has been placed on uranium and its ores. At the time of his discovery he was experimenting with fluorescent and phosphorescent minerals; studying the characteristics of their visible light emissions in an effort to correlate them with the newly-discovered X-ray radiation. He tried exposing specimens of willemite, sphalerite, fluorite, uraninite and others to sunlight and then to a photographic plate in the dark to see if they would fog it. Most of them did. But to his surprise the uraninite fogged the plate *without* previous exposure and moreover, through light-proof paper. Here was a ray that like the X-ray would pierce through a solid substance, but unlike the X-ray did not require any external source of energy to propagate it.

This classic experiment which led to the discovery of Becquerel Rays and to radioactivity may be duplicated at home with the aid of a specimen of radioactive mineral and a photographic darkroom or better still, the cooperation of a scientifically inclined dentist. For taking X-ray pictures the dentist uses a paper-wrapped, lead-backed strip of photographic film. One of these films will serve very well to take advantage of the radiographic (self-photographing) property possessed by the uranium-bearing minerals. These include chiefly URANINITE, a brownish-black mineral with a greasy or pitch-like luster, hence the term "pitchblende"; GUMMITE, an orange-red alteration product of uraninite (name no doubt derived from its resemblence to the luster of a well chewed, dried-up wad of gum); AUTUNITE, a bright green fluorescent min-

eral usually found as a flaky, micaceous deposit on feldspar; and URANOPHANE, an orange-colored, powdery, non-fluorescent alteration product of autunite.

In the author's experiment, specimens containing all of the above uranium minerals were used. The specimens were found by the author in Grafton, New Hampshire. Eleven light-proof Eastman Kodak radia-tized dental X-ray films were obtained. Across the face of each was attached a thin 1/16" strip of lead ¼" wide to act as a shield against the radiation and thereby provide a means of comparison on the film. The first four films were exposed to the same area of the specimen for periods of one, three, six, and twelve hours. The rest were exposed from one through seven days to different areas of a large single specimen. Exposures were made by simply laying the specimen on top of the film. All films were developed simultaneously along with a blank. This served to eliminate any differences in contrast due to varying time of development. The blank taken from the same lot as the other films indicated that they had not been previously light-struck. The accompanying photographs show some of the results. Since they are positive prints the exposed portions appear white. The black strip across each indicates the position of the lead shield. From the results of this experiment it would appear that the best time of exposure for uranium minerals is between six and twelve hours. Under six there is insufficient contrast; over twelve hours the maximum contrast has been reached



Three and twelve hour exposure. Three hours shows some evidence of radioactivity by lightening of areas adjacent to the lead strip. The twelve hour exposure shows marked contrast between the shielded and unshielded portions of the film. The white portions indicate exposure to beta and gamma rays. Alpha rays were cut off by paper wrapping on film during exposure.

and further exposure only affects the shielded portion. It is noteworthy, however, that an exposure of as short as one hour is sufficient to show evidence of radioactivity in unconcentrated minerals such as these.

While performance of an experiment of this sort establishes beyond doubt the radioactivity of a mineral it must be remembered that it only indicates the presence and not the degree. Comparing the degree or strength of one specimen with that of another may be accomplished by exposing the specimens to film for the same period of time and developing the films simultaneously. Comparing the density or amount of fogginess should give a rough indication of the relative activities of the specimens. In the specimens used by the author the high penetrating power of the rays is shown by the fact that the third day specimen began to show definite signs of exposure beneath the thin lead shield.

The radiation emitted from any radioactive substance consists of three distinct rays: alpha, beta and gamma. The alpha and beta rays actually are tiny particles of matter shooting through space. They may be detected by a spinthariscope, a photographic film, an electroscope, a 'cloud chamber' or a Geiger-Mueller Counter. The spinthariscope produces a visible flash of light as an alpha particle impinges on a zinc sulfide screen. The latter three methods depend on the ability of the rays or particles to "ionize" a gas, that is, enable it in effect to conduct an electric current.

Alpha particles are actually charged helium atoms. They are easily stopped by aluminum foil 1/400" thick or even a sheet of thin paper. The photos in the experiment do not show alpha exposure because the film was wrapped in paper. Beta rays are known to be identical to cathode rays but with a higher velocity. They have much more penetrating power than alpha particles. A sheet of iron 1/25" thick can be pierced by them. However as "ionizers" they are not as strong as alpha or gamma rays. Gamma rays are the most powerful of the three. They are identical to X-rays except that they have a shorter wave length and higher penetration. Gamma rays can pass through a piece of iron eight inches thick; ordinary X-rays are stopped by sheet lead.

Radioactive minerals exhibit many strange characteristics of interest to the mineralogist as well as to the chemist and physicist. For example, radioactive substances are warmer than their surroundings. This is due to the stoppage of rays by the material which emits them, causing an evolution of heat. Another important property is their ability to cause certain bodies to fluoresce or phosphoresce. Sphalerite (zincblende) is particularly sensitive to alpha rays. Screens coated with it show minute scintilations where ever it is struck by the particles. This is the principle upon which the spinthariscope is based. Some paints, such as those used on dials of watches and clocks, are made luminous by adding to zinc sulfide a minute quantity of radium which by itself is not luminous. The mineral willemite is fluorescent under the action of all three rays, while barium platinum cyanide is most sensitive to the beta and gamma rays. Fluorite, kunzite, and sphalerite exhibit phosphorescence under the action of beta rays, the luminosity persisting for some time after the bombardment has ceased.

Radioactivity produces a discoloration of certain substances such as glass, which turns brown or violet after long exposure. Diamond and kunzite become green. This is not recommended as a test for radioactivity although the color can be removed by careful heating.

The study of radioactivity is a fascinating one and to the mineralogist radioactivity in minerals is becoming increasingly more significant. It may safely be said that more than any other physical phenomena of nature, the discovery of radioactivity is responsible for forming in the minds of men the theories that eventually led to the release and utilization of atomic energy.

(Continued on page 434)

INDOOR ROCKHOUND

By OSCAR A. ANDERSON
442—19th Street, Bettendorf, Iowa

R. F. Henley, the 77 year youngster who trots over mountains to see what he can see, is a man of my own heart. His "Ramblings of a Rockhound", in *Rocks and Minerals* of February 1948, shows what some of us pups could do, if..... It's that "if" which worries me. Though quite a younger man than Mr. Henley, I do my rockhounding in smooth-floored museums instead of scratching for rocks in the hills. Is that sissy? Is it a disgrace to be an indoor rockhound? As writers to the lovelorn section of newspapers intreat the all-knowing columnists, "Tell me! What shall I do?"

Outdoor rockhounding is all right, understand? I have nothing against it. My own American experiences haven't been too uninteresting. Between a few pickings, sprained ankles, and torn shirts from cat's-claw bushes, I've seen the Southern Cross from mountain tops, watched Venus from deep canyons during the bright day, vanquished scores of rattlers, encountered wild bears and turkeys, laughed with Indians about white men's vagaries, stared at the sun when it was blue, have become lost in the wide desert without landmarks, have been forced to accept hospitalities from a desert rat who thought I had done him some favor. He was so fierce about the hospitality that one couldn't refuse it.

All this was good clean fun. But for something exciting, let me ramble through the chambers of slick-floored museums.

On stepping into one of those relic places, my mind gets like Einstein's. The multiplication table gets out of hand and runs into higher mathematics. I gaze at forty rock specimens in a display case. Those rocks are from Switzerland, New Zealand, Canada, South America and other countries. I figure the thousands of miles and millions of steps it took to find and deliver those choice specimens which lie in front of me. Here I am comfortably enjoying a fine cornucopia of rocks without having received a single sprained ankle or broken leg, as probably would have happened if I had done the hunting and digging. In comparison with the milkman who delivers a bottle to my doorstep so it won't be necessary for me to run to the country and catch a cow, the museum does superman service.

In addition to the assemblage of choice minerals in museums, I've noticed that the human characters who flock around the exhibits are an equally noteworthy collection. For some reason, the fans and hobbyists who hover around the rocks have gray matter which is unusually vibrant. I was studying a case of rock crystals when a retired M.D. speculated about seed crystals being analagous to plant and animal seeds. He was searching for the missing link between the inanimate and the animate in going from mineral to the organic. While most of the world clattered from noisy sword rattling, here stood a man in a silent museum trying to trace the footsteps of creation. Contrary to war mania, this placid doctor was taking a creator view of the earth. All honor to his kind.

At a museum specializing in near-east artifacts, I noted the kinds of stones and gems which had been utilized by ancient Egyptians. Presently a young fellow approached me with a chip on his shoulder. He scorned fuddyduddies in general and must have decided that I was next in line to be told what's what. As a rule I keep quiet about controversial issues, especially when of sectarian nature. A leopard can't change his spots very easily, and most of us have acquired a few indelible blotches under the skin. However, the fuzzy-lipped fellow was bound to battle and I wasn't retreating. As in a fencing duel, we exchanged a series of rapid word thrusts. But that didn't get anywhere. Both of us discovered that we were agreeing and finally wondered, "What are we fighting about?"

At another museum, I ran into an anthropologist who could talk science with everyday words. After seeing that it was possible to do straight talking, I

wanted to know, "What's the idea of you fellows making it look as if the first Indians promenaded from Asia to America on a land bridge like an army parading? There isn't any real evidence that such a recent geological isthmus existed." In reply, he took me to a collection of Indian heads, pointing to one and then another. "See. Different people from various ancestries. Broad-nosed men, Mediterranean type, and other kinds. And the early-day Tepexpan Man turned out to be a round head, instead of conforming to expectations. That land bridge where Bering Straight now exists was a convenience of imagination to fit a theory. But like London Bridge, the hypothetical one at Bering had better be braced up or it will fall down." He was so frank, it took my breath away.

A southern museum has a wonderful collection of minerals in a special room kept under lock and key. I had gone many miles to see this exhibit. But the curator was concerned about the newly published novel, "Knock On Any Door." by Willard Motley. Had I read the book and could such a story be true to life? "Sure, it's a true-to-life story. I'm acquainted with Motley and know something of the background of which he writes. He hasn't told half." Giving that information was a mistake. The afternoon became a literary session, and I hardly got a peek at the fine mineral collection. Now it will be necessary to expend a lot more mileage to see that exhibit properly sometime.

Some museums are like high class jewelry stores and modern art galleries, with their neat displays and elegant furnishings. Others are ramshackle, dim lighted, and spooky as the House of Seven Gables. A few are such antiques that they themselves should be placed in museums. Such was the case of a hoary institution located in a Mississippi River town. I found that this place had more mystery about it than a medieval castle with an oubliette. In fact, this museum had an underground room which was privately known as a Chamber of Horrors. Other chambers contained thousands of tucked away relics which had never been brought to light, including ancient figurines which were disintegrating from dank storage. The general odor of the building, which hit one in the face on entering, was attar of mummy.

Permission was received to open display cases to study some stones. One day I had a fine specimen of lapis lazuli with me while in the office. A staff member exclaimed, "What a wonderful blue! Where did you get that piece?" "This belongs to the museum," I explained. "I never saw it before," he said wonderingly. "Of course not," was my reply. "This stone has looked black—greasy ebony black from years of grime which seeped into the show case."

As an indoor rockhound, my best discovery was an institutional skeleton in the closet. Such skeletons are very hard to locate, which makes them a hundred times more interesting than the ordinary kind found in the usual mystery stories.

The wedge which pried the door open was my curiosity about some famous inscribed tablets of stone and a pair of stone elephant-figure smoking pipes supposed to have originated from prehistoric Indian "Mound Builders." Considering the world-wide fame of these artifacts during the last century, I was surprised to encounter an awkward hush-hush about the subject. Delving into printed Annals of two and three generations ago, I noticed plenty of loquaciousness about these relics. Suddenly the subject was dropped. This abrupt silence was enough to make any rockhound sniff. Birds, beasts, insects, people, institutions don't freeze into tense silence all of a sudden unless there's a reason.

Through careful sniffing of unofficial trails, a few facts were gathered. A board member who doubted the authenticity of the Indian relics had been summarily expelled. When reference was made to another board member, his name was always preceded with a preamble of flattering adjectives. Why all the adjectives? Eastern authorities took sides about the genuineness of the pipes and the three tablets of stone. One man had brought all these questioned artifacts to the museum. The home town of the museum was split

wide open because of the issues and personalities involved. As tempers flared hot, a key man of the mystery conveniently left town.

I managed to see these dubious relics which had been hidden from public view in the museum for many years. One of the engraved tablets looked like an astrology chart with zodiac arrangement. What did ancient Indians know about zodiacs? I smelt the elephant pipes. The odor was like mineral oil, instead of earthy as might be expected after burial of hundreds of years. Other tests made it apparent that these stone artifacts were fakes. Why the long silence about them?

At a meeting of some museum members, I deliberately put a chip on my shoulder. Mild questions get worthless answers when there's a skeleton in the closet to be kept hidden. You have to force the issues. "What's the reason for a science organization protecting and perpetuating a false position?" I demanded. "The last time these artifacts were officially mentioned, all was praise and defense for them. Literature to that effect was distributed around the world. That they are fakes has never been admitted." A representative of the traditional position answered, "We've got to wait a certain length of time before doing anything—until characters involved and near relatives are sufficiently in the past." "How dead do the first characters have to get and how long must we sit waiting for this and that person to die, until the year 2,000?" I wondered. A lady pointed out, "The more we wait the less chance there will be to find the truth—and the wrong people will be kept under suspicion. With facts getting lost, the wrong person will likely get the blame." The general concensus developed that getting a science organization tied up in knots on account of past personalities and errors was a bad mistake; that it was best to confess the mistaken position about the artifacts; and that open season should be declared on the villain of the mystery. Who was he, and what was the motive for involving a whole museum in a fraud?

With the agreement, "Let's have truth in our time," there is no longer an eerie hush-hush through the museum. With nothing to hide or mope about, more thought is given to constructive endeavor. To flaunt the fearsome secrecy of the past. souvenir plaster casts have been made from the notorious relics.

There's a lot of venturing in museums, and I'd hate to give up this hobby. Rockhounding in the mountains and wide open spaces is all right in its way. You get a lot of fresh air and the sunsets are pretty. You get an appetite so that even poor coffee tastes fairly good. Also I used to like the excellent trout of the High Sierras and the Zane Grey country in Arizona. But if it isn't too sissy, I'd like to do more prowling through museums and also private collections. These private collectors are just as interesting and wide awake as habitués who haunt museums. Not long ago I was warned about a rock collector and trader. "Look out for him. He'll get the best of you!" The advice was right. I had an awful time defending myself against his liberality.

Among the private collections which I hope to see is the one belonging to Mr. R. F. Henley of San Francisco. He is a man of my own heart. With all his outdoor achievements, he isn't above doing some indoor rockhounding himself.

A Word of Praise!

Editor R & M:

I should like to put in a word of praise for the excellent opportunity you afford collectors and dealers to share mutual experiences. Your articles are well chosen and extremely interesting.

Scott J. Williams,
Berkeley, Calif.

April 1, 1948

Takes No Chances!

Editor R & M:

Herewith is money order for $3.00 renewal for *Rocks and Minerals*. Can't get along without it and don't want to miss a single issue; as I am not sure when it expires, I am taking no chances, hence my renewal.

(It expires in June, 1948, Mrs. Wilson.—Editor).

Mrs. Lola B. Wilson,
Klamath Falls, Oregon

April 5, 1948

WORLD NEWS ON MINERAL OCCURRENCES

(Bureau of Mines **Mineral Trade Notes,** December, 1947)

I. METALS

ANTIMONY

SOUTHERN RHODESIA.—Virtually all the antimony found in Southern Rhodesia occurs with gold in quartz veins. The principal producers have been the Globe and Phoenix mine in the Gwelo district, where antimony occurs in the form of massive stibnite, the Cam and Motor mine in the Hartley district, the Gothic and Pagamesa claims, and the P. and P. claims in the Lower Gwelo district. It also has been produced in small quantities as a byproduct from other gold properties in the Belingwe, Gwelo, and Hartley districts.
(Minerals Attache William O. Vanderburg, Pretoria.)

CHROMITE

SOUTHERN RHODESIA.—For many years Southern Rhodesia has been one of the principal sources of world supply of high grade metallurgical and chemical chromite. Mining began in 1905 at Selukwe, Gwelo district, and the first recorded production was 3256 long tons in 1906. The first group of 80 blocks of claims was pegged in the northern part of the Great Dyke in 1919 by Peake's Umvukwe Chrome. The property is now owned by the African Chrome Mines, Ltd.

COPPER

The principal producer of copper in Southern Rhodesia is the Falcon mine near Odzi, in the Umtali district, which began smelting operations in 1914. Other mines that have produced small quantities of copper are the Copper Queen and Copper King in the Umtali district, the Alaska mine in the Lomagundi district, the Blockade in the Gwelo district, and the Larrion in the Bulawayo district.
(Minerals Attache William O. Vanderburg, Pretoria.)

MERCURY

SOUTHERN RHODESIA.—No important deposits of cinnabar have been discovered in Southern Rhodesia. The principal occurrence of the mineral has been in the Pilgrim mine, 8 miles southwest of the Lonely mine, Bulawayo district. Here the cinnabar occurs in a stockwork of veins and as impregnations in the carbonated greenstone country rock. Distribution of the cinnabar was sporadic, and after sinking two vertical shafts to a shallow depth, and doing some lateral work, development was discontinued.
(Minerals Attache William O. Vanderburg, Pretoria.)

TURKEY.—According to official figures, output of mercury in Turkey totaled 75 flasks in 1946, compared with 158 in 1945.
(First Secretary of Embassy Warwick Perkins, Ankara.)

NICKEL

SOUTHERN RHODESIA.—The only nickel deposit exploited in Southern Rhodesia is the Noel mine in the Antelope district, where nickel occurs as arsenides, niccolite and chloanthite and the oxidation product annabergite or nickel bloom. The deposit comprises a steeply dipping narrow serpentine vein enclosed between talc and chlorite schists. When the mine was operated, the massive chloanthite was hand-cobbed at the surface, and the concentrate was shipped to Japan for treatment. Nickel also has been found associated with platinum in the Great Dyke, where it occurs in the form of garnierite and zaratite.
(Minerals Attache William O. Vanderburg, Pretoria.)

TANTALUM

SOUTHERN RHODESIA.—Tantalum and columbium occur associated with tin in the Bikita district east of Port Victoria, where small quantities have been produced as a byproduct of tin mining.
(Minerals Attache William O. Vanderburg, Pretoria.)

TIN

SOUTHERN RHODESIA.—Tin was first discovered in Southern Rhodesia in 1908 near the Umniati River, Hartley district, as dessiminated cassiterite in chloritic schist near a contact with granite, Sub-

sequently it was discovered in the Enterprise schist belt east of Salisbury in pegmatite dikes in greisen and in alluvium. The first production was confined to deposits east of Fort Victoria. Tin occurs in the Salisbury, Hartley, Wankie, and Bikita districts.

Most of the cassiterite in Southern Rhodesia is found in micaceous schist country intruded by gneiss, pegmatite, and greisen dikes. Minerals commonly associated with the cassiterite are tourmaline, wolframite, scheelite, tantalite, apatite, fluorite, topaz, and mica.
(Minerals Attache William O. Vanderburg, Pretoria.)

TUNGSTEN

SOUTHERN RHODESIA.—A considerable portion of Southern Rhodesia is covered by granitic rocks, which in places invade schists or calcareous rocks constituting conditions favorable for the occurrence of tungsten minerals, so that scheelite and, to a lesser extent, wolframite are widely distributed. Tungsten minerals have been found in the Hartley, Mazoe, Bulawayo, Wankie, Umtali, Marandellas, and Melsetter districts. Tungsten was first produced in 1906 from the Essexvale deposits southeast of Bulawayo.

Scheelite occurs most frequently in association with gold. It is recovered by gravity concentration as a byproduct of gold mining. Wolframite is found sporadically distributed in quartz veins in greisen, the latter frequently cut by pegmatite dikes. It is generally associated with tourmaline and sometimes with cassiterite, scheelite, galena, fluorspar, and tantalite.

Attention Micro-Mount Collectors!

MICRO MOUNT COLLECTORS! Have you ever, in shaping a specimen had the piece fly into a thousand fragments, only one of which you could locate, and this not containing the perfect crystal so gleefully found after years of patient seeking? Have you searched the far corners of the room, to come across two more specks, also barren of crystals? And has your young son suddenly plucked at his eye, and then tearfully held out a tiny bit, and asked. "Is this what you're looking for, Pop? (Of course this specimen wasn't any good, either.) And at dinner, when you complained of sand in the spinach, has your wife haughtily demanded "And since when has a grain of sand ever had a rhombohedral cleavage?" And in the dark hours just before dawn, when you arose from your slumbers to let the Airdale out, have you finally found the largest and sharpest fragment, now imbedded in the tender portion of your big toe? Have you had to refinish the hardwood floors of your home periodically, because, somehow, you just haven't been able to sweep up all the fragments of shattered rock?

Well, so have I, and it was getting pretty tiresome. But I have a solution, and I'm passing it on so that you, too, can lead a normal and reasonably happy life hereafter.

A large bag, paper, cloth, or plastic (preferably the latter, so you can see what you're doing) does the trick. Get your specimen firmly in the grip of your cutting pliers, place your hand in the sack, and let go. No sparks, no specks, no losses, and no house divided against itself. It's all there, and you may remove and dispose of the contents, piece by piece, enjoying each morsel, much as Ben Franklin did his bag of buns, strolling down the streets of Philadelphia, at peace with the world.

And by the way—if you can't exert enough pressure to cut thru a specimen, try using two tools. The cutter in one hand holds the specimen. An oversize pair of pliers in the other provides additional force on the cutter. If this combination won't do the trick, use a diamond saw.

Leo N. Yedlin

ZIRCONIUM

Mineral Information Service, Division of Mines
San Francisco, Calif., Feb. 1, 1948

Zirconium, in massive form, is a whitish-gray metallic element somewhat resembling antimony. In crystalline form, it belongs to the hexagonal system and is both malleable and ductile. The element produced by some refining processes is separated from its compounds in black, amorphous, powder form. This powder and massive metal prepared from it differ in some physical properties, from massive metal produced by thermal decomposition of zirconium iodide (ZrI_2). The powder form is less stable than the massive form, oxidizing more rapidly and at a lower temperature. It is explosive under certain conditions. Zirconium is attacked by hydrofluoric acid, hot concentrated sulfuric acid, and aqua regia but not by nitric acid and only slightly by concentrated hydrochloric acid. It has an atomic weight of 91.2; atomic number of 40; melting point of 1900°C; sp gr of 6.52; and valence of 4. Zirconium always occurs in combination with hafnium and usually with other metallic impurities. It is very difficult to separate zirconium from hafnium, and the former was obtained in pure form only after years of experimentation by Coster and Hevesy.

Zirconium is found in small quantities in more than a dozen minerals but only two, zircon and baddeleyite, are common enough to be considered ores. Zircon ($ZrSiO_4$) is commonly pale yellow to yellowish brown in color. The rare transparent gem varieties may be colorless, hyacinth red, smoky, or light brown. Color is produced or enhanced by heat treatment of natural zircon. The commonest crystal form is the elongated square prism (usually with terminations). Cleavage is poor, fracture is conchoidal, and luster and refraction approach those of diamond. Zircon is harder than quartz (7.5) and has a higher sp gr (4.68-4.70). Brazilite (ZrO_2), a variety of baddeleyite, is a radial fibrous mineral economically important only in south-eastern Brazil. There, it occurs in pebble placers and pegmatites with titanium minerals.

Although zircon is found in many California placers, only one has produced for the market to date. This is located near Lincoln in Placer County. Investigation of "black sands" in California and other states indicates that zircon can be produced in considerable quantity if the demand and price become great enough. Most present and recent production of zirconium minerals has been from the Caldas district in south-eastern Brazil. Other important locations are: Travancore in India, Ceylon, Madagascar, Henderson County in North Carolina; Coos Bay in Oregon; and Brevard, St. Johns and Indian River counties in Florida. With the exception of North Carolina and Brazil, the above deposits are all placers. Many important Brazilian deposits occur in hard rock.

Zircon is mined chiefly by sluicing and hydraulicking methods. Certain decomposed pegmatites have been mined similarly. Others, notably in Brazil, have been mined by blasting with dynamite in surface workings. Very little underground mining has been necessary in any of the deposits so far.

Zircon is separated from other constituents of heavy concentrates by electromagnetic and gravitational means. Much of it is recovered as a by-product in separation of monazite sand. Probably in future operations all constituents in "black sand" concentrates will be handled rather than only one or two.

Zirconium and its compounds have attained wide usage in a great variety of industries. The oxide zirconia is an exceedingly important refractory material. Bricks, furnace linings, and furnace cements made with zirconia have a high melting point (over 3000°C), high resistance to slag corrosion, low thermal conductivity, and low coefficient of expansion. Zirconia is also consumed in quantity as a substitute for tin oxide in the enamel industry where it is used as an opacifier. It has extensive use in chemical and electrical porcelains. With fused

silica, zirconia is used to increase devitrification and increase tensile strength. Both oxides of zirconium (monoxide and dioxide) are used in glass manufacture to increase durability and chemical resistance. Metallic zirconium is becoming increasingly important as an alloy with other metals, particularly as a hardener in steels. Cooperite, a nickel base alloy containing zirconium, molybdenum, tungsten, silicon, and aluminum, is used for high speed cutting tools. Metallic zirconium is used to increase the ductility of tungsten for filament use. The mineral zircon is a very satisfactory gem material, the blue variety "starlite" having gained wide popularity. Zirconium compounds have a host of minor uses which cannot be discussed here.

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OPTICAL FIRM DEVELOPS NEW TYPE INTERFEROMETER

CLEVELAND—A radically new type of interferometer for measuring flatness of surfaces was exhibited for the first time here during the Tool Engineers Industrial Exposition, Mar. 15-19, 1948.

Unlike previous model interferometers, the new instrument, which is expected to have wide industrial application, can be used at various room temperatures and be operated by anyone after only a few minutes instruction. Operation of the instrument is so simple, it can be adjusted for greatest accuracy in 10 seconds or less, while a skilled technician often required several hours to bring the ordinary type into proper adjustment.

Developed by Dr. W. Ewart Williams, Bausch & Lomb Optical Company consultant of Pasadena, Calif., the high-precision device sets up shadow-like bands of interference in light reflected between its master optical flat, which has a surface accuracy of one-millionth of an inch, and the object being tested.

Unlike ordinary optical flats, (the standard test glass used for measuring flatness of surfaces) the instrument's master optical flat is never brought in contact with the object under inspection, eliminating the possibility of it being scratched, worn out or distorted by the object in contact with it. Surfaces with as much as a four-inch recess, may be viewed with the new instrument, allowing the operator to determine the quality of a surface which could not formerly be reached, without touching it.

With the new interferometer it is possible, for example, to check the flatness of both end surfaces of a gage block, and at the same time, determine whether the two surfaces are parallel to each other.

Field of view of the large model Williams Plano Interferometer is four and one-quarter inches in diameter. The smaller size instrument has a one and seven-eighth inch capacity.

MINERALS OF GRANBY, MISSOURI

By T. A. PATTERSON
RR 1—Granby, Mo.

Granby is located 8 miles east of Neosho in Newton County. It is one of the oldest mining towns of the Tri-State district.

Lead was discovered at Granby in 1850, active mining operations beginning three years later have been carried on almost continuously since that time.

Lead was the only ore mined until 1870 when the value of the zinc ores became known. For several years galena was the principal ore mined, later on calamine became more important until 1897 when sphalerite became the chief product.

The Granby mining area covers about 15 square miles and is drained by several intermittent streams which flow through small valleys, the largest valley extending from Shoal Creek four miles southward to the prairie lands. Between the prairie and Shoal Creek the surface is broken into hillsides and valleys and it was on these hillsides that most of the early day mining was done, later on the level lands near the prairie became the most productive part of the area.

The elevation of the Granby area is from 1,000 to 1,260 feet above sea level, this difference of 260 feet affords opportunity to view the outcroppings of various kinds of rocks. The surface of the area is covered with soil from 6 to 18 inches thick, the subsoil is clay mixed with boulders and fragments of chert of various size. The subsoil, usually only a few feet thick, sometimes may reach to a depth of 60 feet.

The rocks which outcrop in the area belong to the Pennsylvanian and Mississippian periods. The Pennsylvanian rocks have nearly all been removed by erosion leaving only scattered fragments of chert and small areas of shale and sandstone. The Mississippian formation is limestone with layers and nodules of chert in the upper portions. Drilling records show this formation to be from 260 to 380 feet thick. Massive beds of chert sometimes occur at depths of 200 to 250 feet.

Chert, being more resistant to disintegration than other rocks of the area, has been left as fragments scattered over the surface and filling depressions and sinkholes in the limestone. Part of the chert fragments have become consolidated and forms the Granby Conglomerate, other fragments have been completely cemented by the deposition of secondary chert and is known as the Granby Breccia. This breccia is white and black in color, the white fragments are imbedded in a black matrix.

The Granby ores have been deposited in the clay, conglomerate, breccia and solid chert beds filling the depressions and cavities of limestone. Geologists trace the origin of Granby ores to minutely disseminated particles in the Pennsylvanian formation. In the gradual removal of the overlying rocks by the processes of erosion, the downward circulation of groundwater has concentrated the lead and zinc into workable ore bodies of the Granby area.

Cerussite, calamine and galena are found near the surface although these minerals sometimes occur at greater depths. Sphalerite occurs disseminated in the black chert beds and in seams and cavities of massive chert beds at greater depths. Dolomite, calcite, pyrite and other minerals are associated with the lead and zinc ores. Galena, sphalerite and two or more associated minerals are sometimes found in a specimen.

Opportunity for collecting Granby minerals is not so good at the present time as it was when more mines were in operation, yet a careful search of the mine dumps will be rewarded with some good specimens.

Following is a partial list of Granby Minerals

Sphalerite: Occurs disseminated through chert and dolomite, the resin-colored particles are irregular in shape. In shallow mines where decomposition is taking place, the faces of the sphalerite are almost black. Some crystals are red in color and are called "ruby jack" by the miners.

Galena: In the shallow mines of early days most of the galena ore was found in large pockets or openings. Galena occurs in blocks or cubical crystals which are sometimes 4 to 12 inches in thickness, also in thin sheets filling fissures and seams in chert.

Calamine: Occurs in tabular and mammillary form and in massive granular aggregates. Color white, yellow, and blue.

Smithsonite: Occurs associated with calamine. Smithsonite pseudomorphs after calcite are sometimes found. Color of smithsonite found at Granby is white, gray, blue or brown.

Cerussite: This carbonate of lead occurs in small cavities of chert and as thin layers on galena. Its color is white, gray, bluish or sometimes nearly black.

Calcite: Occurs in many forms in this area. In color it is white, gray, brown, yellow or red. Crystals vary from a quarter inch up to a foot in length. A brownish cleavable translucent variety is also present which fluoresces a nice green under the Mineralight.

Dolomite: Crystals have curved faces and are colored white, gray, green, and pink.

Aragonite: Is one of the rare Granby minerals. It is gray or yellow in color, and has a distinct cleavage.

Chalcopyrite: This copper pyrite occurs as small tetragonal crystals on dolomite and sphalerite.

Marcasite: Occurs associated with sphalerite.

Greenockite: This cadmium sulphide occurs as yellow coatings on zinc ores and is rare in the Granby area.

Hydrozincite: Occurs associated with calamine. It has a soft earthy texture and white, gray or yellow in color.

Leadhillite: Occurs in well formed prismatic crystals but is one of the rare minerals of Granby. Color white, gray or yellow.

Anglesite: Occurs as small crystals in cavities of galena. Color is gray,yellow or blue.

Quartz: Occurs as small crystals lining cavities in chert.

Pyromorphite: Has been found in some shallow mines but is very rare in this area. Its color is green, brown or yellow.

Limonite: Occurs in earthy masses, yellow or brown in color.

Aurichalcite: Occurs in bluish-green drusy crystals.

Pyrolusite: This manganese dioxide occurs as black, soft spots in clay and as black dendritic markings in cracks and small seams in chert. The infiltrated manganese assumes a moss or fern-like form and then sometimes has been mistaken for fossilized plant remains.

Traces of other minerals have been reported from the Granby area but are too rare to be of any interest for the collector.

BIBLIOGRAPHICAL NOTES

Prospectors' Guide for Uranium and Thorium Minerals in Canada.

This is a small pocket-size guidebook that has been especially prepared for those desiring to prospect for uranium and thorium minerals in Canada. For the sake of simplicity, the type of data presented has ententionally been restricted to elementary coverage of the bare essentials.

It is 4 1-2 x 6 1-2 inches in size, contains 37 pages, and has been issued by the Bureau of Mines, Ottawa, Canada.

Fifty-Fifth Annual Report of the Ontario Department of Mines.

The report is divided into three sections as follows:

Statistical review of the mineral industry of Ontario for 1945—pp. 1-61.

List of quarries and works for structural materials and clay products, 1945—pp. 62-67.

Mining accidents in 1945—pp. 68-79.

Issued by the Ontario Department of Mines, Toronto, Ont., Canada.

Heavy Mineral Tailings from New Jersey Glass Sands: By James H. Martens.

The active market for zircon and titanium minerals derived from sand has led to inquiries as to the possible sources of these minerals in the New Jersey Coastal Plain. Zircon, rutile and other minerals occur in the sands but in too small amount for commercial recovery.

The report (Information Circular Number Two) consists of 10 pages and is issued by Rutgers University, Bureau of Mineral Research, New Brunswick, N. J.

THE AMATEUR LAPIDARY

HIGH SCHOOL LAPIDARY CLUB

Last fall with the opening of high school at Springfield, Vt., a hobby club in lapidary work was organized by H. L. Chandler, head of the science department. With a background of 21 years of science teaching at the school, 18 of which included a full time mineralogy and geology course offered to students and a large collection of minerals gathered from all parts of the U. S., it seemed only natural to get such a hobby program under way. The materials were there, the student interest was there, the time was available and of course Mr. Chandler was as eager as any of the youngsters to "go to town" on this newer of many present day extra curricula activities in science.

The spirit of the venture moved, took fire and shape and 35 pupils enrolled with another 35 on the waiting list.

The biggest handicap was lack of sufficient machines to allow everyone to work on his particular project. At first an old lens grinder was utilized for sanding and polishing with the sawed blanks being roughed out on a carborundum wheel mounted directly on the motor shaft. While desired speeds could not be arrived at, these simple tools did the trick until the club inherited enough money to buy a "Gem Maker" at $29.50.

Through auction sales of surplus minerals by the local Mineralogical Society (adult group) and financial aid from the Student Athletic Association, enough money has been raised to buy a second "Gem Maker". Shortly the club hopes to be able to purchase a larger unit carrying a 12 or 16 inch diamond saw and several grinding heads mounted in gangs from a central power pulley and thus accommodate more pairs of busy hands.

At present the club meets each Tuesday P. M. during an activities hour to carry on its work. At many other odd times in study periods, after school and during noon hours the club members carry on.

The diamond-sawing, carborundum wheel-roughing out and final polishing requires the use of the machines in the school building but most of the semi-polishing and early stage polishing is done at home on abrasive cloths of different sized grits ranging from 150 to 600. "Bon Ami" has been used very successfully by several of the boys prior to the final tin oxide polish.

Several girls are also enrolled in the club and show a great deal of interest especially in the jewelry end of it.

It is planned to have soon a Saturday P. M. class in metal craft and silver-smithing so that the youngsters may make their own mountings.

A faceting head is being bought shortly so the group can jump from cabochon making to cutting transparencies.

When floor space becomes available it will be possible to move the equipment to permanent quarters and a real lapidary department established in a home of its own. The chemistry lab serves that purpose at the present time as running water, sinks, gutters, gas-heating and power outlets are available there.

In mid-February at the annual school Bazaar, a complete lapidary workshop was set up in the gym along with booths of other clubs and the members demonstrated the complete evolution of a finished stone from the "rough rock" to the gleaming smooth cabachon. Needless to say we had a big audience all afternoon.

This particular hobby is to our knowledge the only one of its kind in New England and should be a popular addition to any school program.

If idleness is the devil's workshop "Old Nick" wouldn't get to first base with this bunch of "eager beavers" in our Lapidary Club. The youngsters are learning and how!

A group of high school students at work in the Lapidary Class at the Springfield, Vt., high school. Mr. Chandler, the instructor, at extreme right.

You Can't Sometimes Always Tell

By J. C. BOYLE F.D.*

While recently assembling and filing old magazines I fell to looking through them. In a copy of the *American Mineralogist* for June, 1916, I found in the minutes of The Philadelphia Mineralogical Society a report by a member that nothing was then obtainable at Moore's Station, N. J. About six or seven years later some of the members uncovered the most surprising amount of epidesmine of unusual quality at this locality. So fine, in fact, that when Dr. L. J. Spencer, Keeper of Minerals at The British Museum of Natural History visited Philadelphia, he was delighted to have a specimen for their collection; a formal acknowledgment of the gift is in my possession.

In *The Mineral Collector* of October, 1896, Maynard Bixby tells of collecting "Sand Topaz" crystals and a black cubic mineral (afterward named Bixbyite) in the Thomas Range, Utah, and says the locality is very limited—"in fact, the last collector to visit the ground couldn't get a terminated topaz and but little of the new, and as yet unnamed mineral". About 40 years later Mr. Arthur Montgomery was mining both on a somewhat grand scale.

All of which reminds me of the Persian Court Musician, who, taking up his lyre, thus entertained the court—

'Never give up;
Failure's absurd.
Never say die—
BLEACH is the word.'

*F.D.—Doctor of Foolishness.

PRODUCE WORLD'S HIGHEST "WINDOW"

ROCHESTER, N. Y.—A new astro-window through which navigators aboard long range stratosphere airliners will "shoot" the stars, even in daytime, has been developed by Bausch & Lomb Optical Company.

Designed for Air Force and commercial ships, the streamlined "window" consists of two plates and is capable of withstanding a total force of three and one-half tons. Its surface projects only two and one-half inches above the ship's skin as compared to six inches in the old-type, speed-retarding astro-domes.

The astro-window's outer plate is a large optical lens that has been ground and polished to reduce refraction errors regardless of the angle of the sighting instrument. The inner plate is plastic and houses a defrosting system that should prove "invaluable to celestial navigators," according to its designer, Edward F. Flint, of the optical firm's Scientific Bureau.

While he declined to reveal the pressure capacity per square inch of the new astro-window, he said it "out-does by far all contemplated requirements."

He reported that on stratosphere flights, the astro-window eliminates much of the difficulty encountered by navigators in shooting the stars, even the dimmer ones, regardless of the weather or the hour of day or night.

"The higher man flies," he said, "the plainer the stars become, allowing for continuous and accurate aircraft fixes anywhere over the earth. Contrary to popular notion, the higher you go, the simpler sextant observations become. In the stratosphere the sky tends to become darker and stars are readily seen in the daytime."

On overseas hops, he said, fixes are taken about every half-hour with modern bubble sextants, two of which are standard equipment on long range aircraft.

Preliminary Catalog of the Colorado Gem Co.

The Colorado Gem Co., of Gem Village, Bayfield, Colo., have released a preliminary catalog on minerals. The catalog contains 17 pages and features, alphabetically, a large number of minerals, many of which are of gem quality.

CLUB AND SOCIETY NOTES

ATTENTION SECRETARIES—If you want your reports to appear in the July issue, they must reach us by June 8th—the Editor.

New York Mineralogical Club

Columbia University (Schermerhorn Building), New York City, Wednesday, March 17, 1948

The following members were nominated and elected to serve on the nominating committee; Mr. Ernest Maynard, Mr. James Taylor, Dr. Daniel O'Connell, Mr. Harry Lee and Mr. E. Lawrence Sampter.

The death of Herbert P. Whitlock, Curator Emeritus of the American Museum of Natural History, was announced. Mr. Gilman Stanton gave a resume of Dr. Whitlock's career. Dr. Whitlock was an Honorary Member and a past officer of the New York Mineralogical Club.

Mr. James Taylor proposed that a resolution of regret be prepared and sent to Dr. Whitlock's family from the club.

Zoila Avalos, John Castano, William Cohen and Georgina Lemon were elected to membership.

The speaker of the evening was Dr. J. D. H. Donnay who spoke on "The Amazing Geometry of Twinning". He first defined the terms lattice, net, row and node and pointed out that crystal faces are parallel to nets. A twin crystal results when two or more crystals intergrow according to some definite law. They can be designated as either contact twins or penetration twins. Contact twins have a definite composition plane separating the two individuals whereas penetration twins have an indefinite composition plane and are made up of interpenetrating individuals.

A twin lattice differs from a simple crystal lattice in that it does not show a perfect periodicity but a partial periodicity. A twin lattice may be built on two possibilities; either a simple lattice or a multiple lattice, one in which the lattice is built with larger nets.

In the case of a simple lattice the deviation may be zero in which case the lattice has greater symmetry than the crystal and is called merohedry; or the deviation is greater than zero in which case the lattice almost has greater symmetry than the crystal and is called pseudo-merohedry.

In the case of the multiple lattice the deviation may be zero and we have reticular merohedry or the deviation may be other than zero and we have reticular pseudo-merohedry.

These types are all known as triperiodic. There is another type of twinning in which we have node over node and this is called monoperiodic. Quartz shows this type of twinning.

The talk was illustrated by lantern slides.

Purfield Kent, Sec.

Cincinnati Mineral Society

The regular meeting of the Society was held at 8:00 p.m. on March 31, 1948, at the Cincinnati Museum of Natural History.

A brief review of the success of our exhibit of local and associated minerals revealed that approximately 5,000 persons viewed the exhibit daily. An estimated 30,000 persons were attracted to the exhibit during the one week of its showing.

A vote of thanks was made for the very able assistance of Mr. Ralph Dury, and his assistant, Miss Brammer, of the Museum. The very apparent success of this venture will lead to similar displays in the future.

In line with the topic of the evening, namely "Mineral Localities near Cincinnati, Ohio", tentative plans were made for field trips in the coming month. Two alternates are being considered, one to the Copperas Mountain Area near Bainbridge, Ross County, Ohio, and the other a trip along Ohio Route 125 to West Union, Ohio. This route is dotted with at least 10 collecting areas and should prove very good.

General discussion of collecting areas within 125 miles of Cincinnati held the interest for the rest of the evening.

It was also decided to launch on a program of cataloging all known mineral localities in the area. This will be a long term project and should turn out to be of interest to all mineralogists. It is planned to make it very complete and will finally be assembled in such a way that it can be supplemented as new areas are reported.

The meeting closed with an examination and discussion of the specimens of the exhibit.

The writer has just received information of recent blasting at the Copperas Mountain Area, so a field trip is planned for Sunday, April 11, 1948, to the location.

Charles L. Gschwind

Cincinnati Mineral Society

The Cincinnati Mineral Society, of Cincinnati, Ohio, has recently issued its new membership cards. These cards are very attractive, of a pleasing yellow color, and so far as is known, they are the only ones in the country to feature the insignia of the Rocks and Minerals Association—the Society is affiliated with the Association.

Incidently the Editor of *Rocks and Minerals* has been made an honorary member of the Cincinnati Mineral Society.

Georgia Mineral Society Field Trip

On Saturday March 27, 1948, the Georgia Mineral Society, of Atlanta, Ga., sponsored a field trip to Muscogee and Chattahoochee counties and the Fort Benning area near Columbus, Ga.

The trip was led by Prof. A. C. Munyan of Emory University and Dr. S. M. Herrich (U. S. G. S.). At the last minute Capt. Garland Peyton had to drop out which was regrettable.

The party stopped first just outside of Warm Springs to gather specimens of Itacolumite which was plentiful in the road cut. The next area visited was just off the Columbus-Buena Vista highway where Randall Creek enters the Military reservation, here was a sand and pebble beach where silicified wood, pyritized wood, lignite and several varieties of quartz were found. The pyritized wood and lignite were both found in the creek and also along the shore. The prize of the day was found by J. Roy Chapman. This was a large section of silicified wood about 12 to 14 inches in length and tapering from about 10 inches in diameter to about 7 or 8 inches. The party had lunch along the sandy beach and after lunch Prof. Munyan took a group picture in color. We then proceeded several miles to view two sections of silicified wood in a road cut off the main highway the sections were approximately 5 to 6 feet in length, the smallest being about 18 to 24 inches in diameter, the larger section was embedded in a clay bank but was several inches to a foot larger.

From this location the party proceeded to the ASTP and Sand Hill area of Fort Benning and in a road cut along the highway very nice specimens of Gypsum (selenite var.) were found. (Only known location in Georgia.) Fossil shells were also plentiful and some may polish beautifully.

The trip logged 300 miles or better and all were tired, but a happier and more satisfied bunch of Rockhounds would be hard to find anywhere.

S. C. Knox, Corres. Sec.

The Georgia Mineral Society
Atlanta, Georgia
April, 1948, Meeting

Before the meeting the members present enjoyed a picnic supper which was held on the veranda of the museum at Fernbank, a children's museum and campsite set in a natural wilderness of 70 acres in the midst of the city. Mr. Ken Lewis is the director and has accomplished some fine work for the children of this area, and has plans for an even better future. More power to you, Ken, and the best wishes of the Society for continued success is yours.

After the picnic, Mr. Lewis got the crowd together in the fourth floor projection room where a brief business meeting was held, then the floor was turned over to Ken who gave a brief history of Fernbank, its organization, and its services to all children who wish to use it. Ken is a member of the Society and naturally is planning a mineral exhibit and also lapidary equipment is to be installed in connection with the numerous other activities he is engaged in. After this interesting outline, he had the room darkened and we viewed an excellent color reel of the activities and other aspects of Fernbank, with ad libs from Ken at appropriate times. Next came the captured German films on various phases of the glass industry, strip mining and processing of brown coal and one reel on the Goldsmiths art. Ken did an excellent job of translating the sub-titles which were in German script, and this made viewing them all the more enjoyable.

With such a genial host as Mr. Lewis the meeting was a success from the start, and we hope to be able to meet at Fernbank again in the near future.

S. C. KNOX
Corresponding Sec.
2142 Memorial Dr. S. E.
Atlanta, Ga.

Long Beach Mineralogical Society
(Long Beach, Calif.)

Every third month the Long Beach meeting is started with a pot luck dinner. As usual the tables were loaded with good eatables, and everyone became duly stuffed. This custom of having a pot luck has always been a high light in the activities of the Long Beach Group, because eating time is a get-acquainted time. With so many new members coming in all the time it's hard to get acquainted at the regular meetings, but the dinner meeting soon makes a newcomer feel like an old member.

After the dinner, Pres. Roy Wagoner showed color slides of the claim which the club recently staked out. In as much as our president was the leader in locating the bed, the claim is known as the Wagoner Bed. The claim is open to all rock hounds. This action was taken not to keep the area for the Long Beach Society but rather to keep the area open to all those who want to dig for Geodes.

Chattanooga Rocks and Minerals Club

The March meeting was held on the 17th, in Room 51, Univ. of Chattanooga. Prof. B. K. MacGaw and Mr. Otto Gutenson brought in thin sections of various minerals. These together with slides of coal peel, sands, clays and shales were examined microscopically in plain and polarized light. Mr. Frank Bates brought in a box of fossilized horsetails and ferns from the coal mines on Waldens Ridge.

Prof. MacGaw read a communication from the Georgia Mineral Society in Atlanta. An effort will be made to join them in a future field trip in north Georgia. Miss Marcia McMillin became a new member.

Geo. C. Olmsted Pub. Com.

Rochester Academy of Science
Mineralogical Section
Rochester, New York

The regular monthly meeting of the Mineral Section of the Rochester Academy of Science was held on Thursday, February 12, 1948, at 8 p.m., in the Rochester Museum of Arts & Sciences. There were 39 members and guests present.

After the minutes of the last meeting were read and approved, Mr. Walter Wright, Recorder of the Section, tendered his resignation effective immediately, as he plans on moving to New Mexico. A vote of thanks was given Mr. Wright for his excellent work as Recorder. Mr. William Nelson Secrist was appointed to fulfill the balance of the term as Recorder.

While Mr. Houlihan and his committee were arranging the designs submitted for the voting on the emblem contest, members displayed specimens they had brought.

The principal event of the evening was a talk on Synthetic Gems by Mr. John E. Hartfelder. He read and amplified a paper on the production of synthetic gems by A. K. Seemann, engineer for the Linde Air Products Company. He traced the development of the production of synthetic crystals from the research and experimental stage before the war, through the intensified research and production during the war, to the production of crystals for gem stones since the war. He spoke of the problems that came up, how they were solved, and of the latest addition to the synthetic gem family, the star ruby and star sapphire. A film on the production of the boule, the grinding and polishing of the synthetic stone into a jewel bearing, was also shown. The film in color, was produced by the Elgin Watch Company.

A design submitted by Mr. Potter received the most votes and the First Prize of a $5.00 gift certificate on Ward's was given him. An auction was held afterward which resulted in the treasury being enriched by $1.11.

William Nelson Secrist
Recorder

North Country Mineralogical Club
(Plattsburg, N. Y.)

The February meeting of our Club, postponed for two weeks because of the holiday on February 12th, was held on February 27th, 1948, at the Plattsburg State Teachers College. The program included the first two of a series of short talks on the birthstone for each month. Ruth Williamson, a junior high school student at the P. S. T. C. Laboratory School, told about the January birthstone, garnet. She discussed especially two varieties of garnet, almandite and andradite, showing specimens which Mr. Arthur Sandiford had secured from Roxbury Falls and Upper Merryall, Connecticut. Miss Lillian Allen told about amethysts, the birthstone for February. Besides discussing the gem as a mineral, she told of some superstitions and traditions associated with them. The rest of the program was devoted to moving pictures on the evolution of the oil industry, accompanied by explanations from Dr. Everett A. Manwell, of the State Teachers College faculty. This was a valuable follow-up to the talk which he gave at the January meeting.

The regular meeting was held on Thursday evening, March 11th, at the Plattsburg Public Library. The series of talks on birthstones was continued by the president of the Club, William R. Ellsbury. Mr. Ellsbury traced the history of the idea of natal stones, and discussed the three gems which at various times have been assigned to March, bloodstone, jasper, and aquamarine. The main part of the program was furnished by Mr. Harold Benson, of the Chemistry department of Champlain College, assisted by Marek Allapin, a student there. The topic was the chemical elements in minerals. After experiments showing a delayed chemical reaction (due to the presence of a "negative catalyst") and chemical fire-building, they showed how a mineral, salt, could be made from its elements, sodium and chlorine.

Tentative plans have been made for combining our first field trip of the 1948 season with a "sugar-party", during the maple sugar season. The exact date will have to depend upon the weather.

Gertrude E. Cone, Sec.

Mineralogical Society of the District of Columbia

The regular monthly meeting of the Mineralogical Society of the District of Columbia was held in room 43 of the U. S. National Museum Washington, D. C., on February 20, 1948.

A near record crowd of members and guests turned out for this meeting. After a short business meeting the program was turned over to the guest speaker, Lt. Col. George C. Branner, U.S.A., of Fort Belvoir, Va. Lt. Col. Branner was State Geologist of Arkansas for 18 years, a post that was held by his father before him, and was well qualified to talk on his chosen subject.

He spoke on Strategic Minerals, and his lecture was well illustrated by charts that showed the percentages of the various minerals needed by this country, the locations where they are obtained, and the degree in which this country is dependent on other nations for a large proportion of these vital materials.

After the lecture an open forum was held, and it was brought out that almost any amateur rockhound might stumble onto a discovery that may be of great strategic importance.

Give away specimens of pegmatite minerals from the property of Mr. F. W. Garret of Preston, Va., were gladly received by the members.

Philip R. Cosminsky

Newark Mineralogical Society

The 255th regular meeting of the Newark Mineralogical Society was held Sunday, February 1st, 1948 at 3 p.m., in the Newark Museum, South Gallery of the Science Department. The meeting was preceded by a fellow-ship hour which started at 2 p.m.

The first business order of the meeting was the decision of the Society to exhibit some New Jersey minerals at the First National Convention of the American Federation of Mineralogical Societies, June 13th to 16th, 1948, at Denver, Colo., and accepted Mr. Edwin Skidmore's offer to display them to the best advantage and boost our Society at the convention.

The program for the afternoon consisted of a symposium on foreign minerals. Rare minerals from the four ends of the earth covered three large tables. Mr. John Albanese was designated as the main speaker and he led off with a detailed description of his large display. His talk carried the audience from primitive man's discovery of minerals, chiefly gold, copper, tin and iron, the early metallurgical progress of the early metals, to the rarer minerals, finishing with radio-active minerals.

The next speaker was Dr. Paul Walther who displayed and described rare European crystals he personally collected while living in England.

Our untiring and efficient secretary, Mr. Louis Reamer, began his talk by stating that his traveling and collecting were done by mail. One could not help but covet his showing and his knowledge of them.

Mr. Leonard Morgan contributed with some Canadian amethyst from Thunder Bay, Ontario, and other Canadian minerals he had collected on trips.

Mr. Albert White exhibited barite from Cumberland, England; crysotile, Quebec, Canada; hematite, Cornwall, England; and Wulfenite, Mexico.

Herman E. Grote,
for Publicity Committee

Mineralogical Society of Southern Nevada

As a follow up of the mineral show held by the Mineralogical Society of Southern Nevada, Inc., on March 6th, Mr. M. G. Mastin, Boulder City, Nevada, spoke on the subject of chemistry as applied to mining. This was well received since many of the approximate 500 persons attending the show were interested in learning more about the tests which were demonstrated there.

Mr. Mastin, graduate of the University of Minnesota, and former Technical Director at the Oak Ridge project, so expertly handled the subject that everyone left the lecture with the satisfaction of having spent a very profitable evening.

D. McMillan,
Publicity Chairman

Pan-Tek Pocket Microscope

The following item sent in by Mr. Ralph T. Salsbury, of Mission Mineral Mart, San Diego, Calif., may be of some interest to our readers:

"The Pan-Tek Pocket Microscope is one of the finest tools for the mineralogist or the lapidary that has been developed in recent years. I am personally acquainted with the manufacturer and know that the very best in material and optical design have been incorporated into the instrument. Although small in size, about the size of a large fountain pen, it has a surprisingly large field and the image is sharp, clear and undistorted. The 48-power magnification brings out details on a specimen that no ordinary magnifier can hope to equal. The student of minerals may use the pocket microscope to advantage either at home or afield. Large specimens or those in place may never be brought to the conventional microscope, even if one is available. The pocket unit makes it a thing of ease. The collector of miniatures may keep a collection of the world, microscope and all, in a cigar box and carry it in an overnight bag for evening study in a hotel room. For a few cents he may own a micro-mount of rare and beautiful crystals which, with the aid of the new pocket microscope, will rival anything in the great Harvard collecton. People who are cramped for room, and who isn't these days, may now keep a fine collection in the bureau drawer. The fellow who owns a piece of Wulfenite as big as a dime may now gain more in pleasure and knowledge from his little specimen than the man who pridefully exhibits a piece as large as a cabbage. And incidently the fellow with the big piece will never know how he invested his money by squinting at his valuable crystals through a pocket magnifier. The low price that the pocket microscope retails for is made possible only because the manufacturer has tooled up his factory for volume production. The mineral and home lapidary business could not make such volume possible at the present time but the wide usage of a portable hand microscope in other fields gives the rock people a break. The little instrument has dozens of uses. It is equally at home in any home craftsman shop, in the factory or industry at large."

RADIOACTIVITY IN MINERALS

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